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Experiencing and Responding to Climate Change in the Andes

- Campesino Experiences with – and Responses to – Changes in the Climate in the Andean Highlands of Southern Ecuador

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Abstract

Climate change poses a significant challenge to society, in particular as it constitutes a threat to food security. Considering Andean *campesinos* are heavily affected by changes in the climate and substantially contribute to the food security of the larger Andean population, it is crucial to investigate their experiences with – and (undertaken and proposed) responses to – changes in the climate. The objective of this research is to investigate what campesinos in the Andean highlands of Southern Ecuador consider to be effective and appropriate responses to changes in the climate, and how this is influenced by perceptions, values and knowledge related to these changes. This is done by means of semi-structured interviews centered around the four axioms of perception, values, knowledge and response (as identified by Roncoli et al 2016). The study finds that reforestation (with native species), reducing contamination (of waste and toxic residues), and improving education on how to behave towards the environment are recurrently considered to be effective and appropriate responses to changes in the climate by campesinos in the highlands of Southern Ecuador. Locating the *perceived* changes and the *known* causes of changes in the climate in the immediate environment, along with *values* related to taking social responsibility for changes in the environment, are suggested to have contributed to the research participants largely taking on the responsibility themselves to undertake the strategies to limit future changes in the climate. The results of this research are important for a more contextualized understanding of climate change, and for the development of climate change response policies that reflect campesino needs, values and interests, and – as such – are expected to have a greater success rate of implementation due to greater local acceptance.

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Contents

Chapter 1: Introduction

1.1 Research Problem and Objective

Climate change poses a significant challenge to society, especially as it constitutes a threat to food security (see e.g., FAO 2017, p.41-43). Despite bearing little responsibility for the causes of climate change, Andean[1] *campesinos* (i.e., 'peasants' or 'people from the countryside') are expected to be significantly affected by these changes. The reasons for this include: 1) a dependence on the environment for their livelihood and subsistence, 2) living in a region that is highly susceptible to the impacts of climate change, and 3) unfavorable socio-political conditions (e.g., institutionalized marginalization of agrarian communities). Nevertheless, the perspectives of Andean campesinos are ignored – or only considered secondary – in research, policy and decision-making regarding climate change. This exclusion is largely the result of a favoring of a construction of climate change as a global phenomenon requiring de-contextualized, uniform knowledge of the quantifiable biophysical impacts. However, climate change not only consists of aggregated statistics of climatic variables, as for many people it involves felt changes in their lived reality (see Allison 2015, p.494; Córdova et al 2019, p.2; Houtart 2014, p.172; Hulme 2010, p.560).

Therefore, the objective of my research is to pay greater attention to Andean campesino experiences with – and their (undertaken and proposed) responses to – imminent and ongoing changes in the climate. This is expected to contribute to the development of a more contextualized understanding of climate change, and the identification of strategies to respond to climate change that reflect campesino needs, values and interests. The identification of such strategies can contribute to the development of more inclusive and contextually appropriate climate change response policies with a greater success rate of implementation due to greater local acceptance. Without adequate recognition of the perspectives of Andean campesinos, these policies might perpetuate marginalization, undermine rights to land and water, deny self-determination and/or adversely affect campesino livelihoods (see Belfer et al 2017, p.57-58; Ramos-Castillo et al 2017, p.2; Whyte 2017, p.1).

1.2 Research Approach and Questions

The perspectives of campesinos from the Andean highlands of Southern Ecuador are studied by means of four axioms: perception, values, knowledge, and response (as identified by Roncoli et al 2016). These axioms are directly related to the research questions. The main research question is formulated as follows: What do campesinos in the Andean highlands of Southern Ecuador consider to be effective and appropriate responses to changes in the climate, and how is this influenced by perceptions, values and knowledge related to these changes? This question is divided into four sub-questions: 1) What changes have the campesinos in the Andean region of Southern Ecuador detected? (referring to the axiom perception); 2) How are values affected by perceived changes in the climate, and how might values shape human moral behavior towards the environment? (referring to the axiom values); 3) How are the perceived changes in the climate understood in terms of its causes? (referring to the axiom knowledge); 4) What strategies do campesinos in the Andean region of Southern Ecuador undertake or propose to undertake in response to changes in the climate? (referring to the axiom response).

1.3 Outline of the Chapters

The next two chapters (chapter 2 and 3) are mainly focused on introducing the reader to the research context. Chapter 2 provides information on campesino agriculture in the Andean highlands, and outlines the motivation for the research. Chapter 3 includes an introduction to the case-study, a discussion of the research approach and methods, and a brief overview of the theoretical framework.

The following chapters (chapter 4, 5, 6 and 7) are all concerned with one of the four axioms. Chapter 4 discusses the axiom perception, chapter 5 revolves around the axiom values, and chapter 6 is focused on the axiom knowledge. Finally, chapter 7 is concerned with the axiom response and addresses the main research question. The main findings and contributions of the research are summarized in the conclusion, in chapter 8.

Chapter 2: Background

2.1 Introduction

Climate change is widely considered to constitute one of society's most significant challenges, in particular as it represents a large threat to agricultural production and food security, especially in the face of a growing global population and food demand. In arid and semi-arid regions, particularly in Africa and the highlands of Asia and South America, climate change is already compromising access to a sufficient amount of food (Altieri and Koohafkan 2008, p.1; Challinor et al 2014, p.287; FAO 2017, p.41-43; Godfray et al 2010, p.812; Mbow et al 2019, p.439; Wheeler and Braun 2013, p.508). In light of the challenge of climate change, this chapter argues for the need to study the experiences of campesinos in the Andean highlands with changes in the climate and their (undertaken and proposed) responses to these changes. This argument is largely based on three inequitable dimensions of climate change: 1) a globally differentiated responsibility for the causes; 2) uneven susceptibility to the impacts; and 3) unequal representation in decision-making (see Scoville-Simonds et al 2020, p.2-3). In this chapter, first, campesino agricultural production in the Andean highlands is described. Second, the unequal impact of climate change on Andean campesinos is discussed. Finally, the exclusion of various groups in climate change decision-making, discourse and policy is addressed.

2.2 Andean Campesino Agriculture

Throughout this study, the term 'campesino' – instead of 'farmer' or 'peasant' – is used in order to refer to the people that this study is concerned with. This is because for many members of rural communities in the Andes, agriculture is not primordial in regards to their livelihoods as they are commonly engaged in multiple forms of income generation. Moreover, the English term 'peasant' generally has derogatory connotations, while the Spanish term does not (see Bebbington 2019, p.2; Boelens and Hoogesteger 2017, p.102; Hoogesteger and Verzijl 2015, p.14). Campesino agricultural production is often limited by a reliance on family labor, and – as such – is largely focused on staple foods instead of cash crops in order to produce a sufficient amount of food for the subsistence of the household, while surplus may be sold at local markets (Bebbington 2019, p.2; 14). Nevertheless, in Ecuador (and in other Andean countries), campesinos are the main providers of food for the country's population. It is therefore in the interest of the entire Andean population's food security to ensure that campesinos have access to a sufficient amount of water and productive land, but in policies regarding water management and land distribution their interests are largely disregarded (Boelens 2015, p.2; Cremers et al 2005, p.38; Houtart 2014, p.171; Houtart 2017, p.18). Indigenous campesinos, originating from various indigenous groups (e.g., the Cañari, Saraguro, or Palta), are diversely integrated with non-indigenous campesinos in rural communities in Ecuador (Andolina 2012, p.8).

Agriculture in the Andean highlands knows many challenges resulting from steep mountainsides that are subject to erosion, poor soil quality, enduring temperature extremes, high winds, and highly variable seasonal rainfall patterns ranging from periods of prolonged drought to periods of intense storms and hail events (Bebbington 2019, p.81; Oyarzun et al 2013, p.517). Andean rural communities have developed a sophisticated body of knowledge and practices through generations that has allowed them to ensure basic needs despite climate variability, uncertainty and risk in the region (Boillat and Berkes 2013, p.10-11; López et al 2017, p.31-32; Oyarzun et al 2013, p.517; Torres 2014, p.1; Vidaurre de la Riva et al 2013, p.110). These practices include: distributing risk across altitudinally arranged agroclimatic belts; terracing to reduce erosion and enhance the infiltration of water; raised fields to reduce the risk of frost, periodic drought and flooding; irrigation systems to prolong the growing season; and distributing risk across a diverse range of crops and varieties (Altieri and

Koohafkan 2008, p.34; Borsdorf and Stadel 2015, p.50; 113-115; López et al 2017, p.31-32; Oyarzun et al 2013, p.517).

The cultivars grown by campesinos in the Andes are generally well adapted to the environmental conditions of the region, as these cultivars have been domesticated in the Andean highlands for centuries (Borsdorf and Stadel 2015, p.214; Meldrum et al 2018, p.704). It includes various cultivars with origins in the Andes, such as the potato (*Solanum tuberosum*), manioc (*Manibut esculenta*), oca (*Oxalis tuberosa*), olluco or melloco (*Ullucus tuberosus*), quinoa (*Chenopodium quinoa*), cañahua (*Chenopodium pallidicaule*), isaño (*Tropaeolum tuberosum*), lupin or chocho (*Lupinus mutabilis*), tomato (*Lycopersicum esculentum*), guava (*Psidium guajava*), beans (*Phaseolus vulgaris*), and tobacco (*Nicoteana rustica*). Other cultivars that are commonly found in the Andes were first domesticated in Mesoamerica, but have now been cultivated in the region for a long time, such as maize (*Zea mays*), avocado (*Persea americana*), papaya (*Carica papaya*), and agave (*Agavaceae* sp.). Moreover, various cultivars from outside the region appear to be well adapted to the environmental conditions of the Andean highlands, such as the tree tomato or tamarillo (*Cymphomandra betacea*), babaco (*Carica* sp.), and mashua (*Tropaeolum tuberosum*) (Altieri and Koohafkan 2008, p.34; Borsdorf and Stadel 2015, p.214-215; Oyarzun 2013, p.517; Meldrum et al 2018, p.704; Young and Lipton 2006, p.67). In the Andes, cultivation is commonly combined with animal husbandry of cattle, horses, sheep, alpacas and/or llamas, which provide fiber, meat, milk, manure, and fuel (Borsdorf and Stadel 2015, p.227; López-i-Gelats et al 2015, p.267; Young and Lipton 2006, p.68).

Irrigation systems in the Andes are regularly managed by the community (or water user associations) through collective action based on mutual dependence and reciprocal social relations of labor and knowledge exchange among users. However, Andean campesino autonomy – involving control over their own waters and related organizational forms – is under threat due to legal norms of state-based governance systems (Boelens and Hoogesteger 2017, p.96-97; 102-103; Hoogesteger and Verzijl 2015, p.14; Young and Lipton 2006, p.77). Similarly, in the highlands of Ecuador, most irrigation systems are autonomously governed by the community through local normative frameworks (e.g., locally defined rules, obligations, and rights), collective action, and reciprocity. Water is commonly transported to the fields by means of irrigation canals, and some irrigation systems are pressurized to enable sprinkler irrigation (Hoogesteger 2013, p.5; 79; 347; Hoogesteger et al 2016, p.97-98).

2.3 Andean Campesino Vulnerability

Despite bearing little responsibility for the causes of climate change, Andean campesinos are among the populations who are most heavily affected by climate change due to a number of factors. One of these factors concerns a reliance on the environment and the succession of well-established seasons for the subsistence and livelihoods of campesinos (see Agrawal and Perrin 2009, p.353; Córdova et al 2019, p.2; Haden et al 2012, p.1; Ponce 2020, p.1; Ramos-Castillo et al 2017, p.2; Sanderson et al 2015, p.137). Secondly, Andean campesinos are heavily affected by the impacts of climate change because the Andean region is highly susceptible to climate change due to a reliance on water from glaciers for domestic and agricultural use, and high inter- and intra-annual climate variability (Chevallier et al 2011, p.S179; Coudrain et al 2005, p.931; Stensrud 2016, p.77-78; Urrutia and Vuille 2009, p.1; Vuille 2013, p.13; Zoomers 2010, p.146). In the Andes, water sources are already adversely affected due to changing precipitation patterns, glacier-retreat resulting in changes in the hydrological regimes downstream, and changes in evapotranspiration (as a result of changes in temperature, radiation and humidity). These climatic changes have significantly reduced the amount of water available for agriculture, exacerbating the already rough growing conditions of the Andean highlands

(Buytaert et al 2009, p.1; Francou et al 2013, p.65; Schewea et al 2014, p.3245; Urrutia and Vuille 2009, p.1).

Thirdly, Andean campesinos are heavily affected by climate change as a result of unfavorable socio-political conditions in terms of higher poverty rates, lower education levels, injustices in access to land and water, lack of representation in decision-making processes, and institutionalized marginalization of agrarian communities in the Andes (including Ecuador) (see Belfer et al 2017, p.58; Borsdorf and Stadel 2015, p.228; Cochet and Gasselin 2007, p.295; Córdova et al 2019, p.2; Hentschel and Waters 2002, p.35; Houtart 2014, p.172; Ponce 2020, p.1; Sanderson et al 2015, p.137). For example, in the Ecuadorian highlands, access to land is highly unequal resulting from agrarian reforms in which small proportions of largely unproductive land were transferred to campesino communities (Hentschel and Waters 2002, p.35; Hoogesteger et al 2016, p.97; Houtart 2014, p.170). Similarly, access to water for irrigation is distributed in a highly unequal manner in Ecuador, as campesinos' rights to water continue to be undermined due to the expansion of other water-use sectors (e.g., mining and industry), intervening state-based governance systems, limited participation and representation of campesinos in decision-making, and privatization policies (Cremers et al 2005, p.37-38; 45-46; Houtart 2014, p.172; Houtart 2017, p.18). Water reforms and intervention programs in the Andes have had adverse effects on campesino communities through the imposition of presumed universalistic principles of water development and planning, which fail to account for existing laws, values, aspirations, and water-use practices (Boelens et al 2010, p.3; Boelens 2015, p.15; Boelens et al 2012, p.1-3; Gelles 2010, p.119; Jackson 2018, p.120). Thus, water and land access in Ecuador (and the Andes in general) is not only determined by absolute availabilities, but is largely a function of historical and contemporary distribution patterns and encroachment practices (Gaybor 2011, p.200; Hidalgo et al 2017, p.68-69; Hoogesteger and Verzijl 2015, p.13).

In particular for indigenous campesinos, anthropogenic climate change can be described as an intensification of adverse environmental changes imposed on indigenous societies through the process of colonialism, as colonialism shaped the economic conditions for anthropogenic climate change, and created the social and political conditions that currently hinder indigenous resistance and resilience to the impacts of climate change (Cameron 2012, p.104; Green and Raygorodetsky 2010, p.239; Norton-Smith et al 2016, p.12; Turner et al 2000, p.1276; Whyte 2017, p.153-154). For this reason it should be remembered that "vulnerability is the product of systems of inequity, not a characteristic inherent in a single community" (Marino 2015, p.96).

2.4 Andean Campesino Exclusion

Research, decision-making, and discourse on climate change commonly involve the exclusion – or only secondary consideration – of various marginalized groups, including indigenous and non-indigenous Andean campesinos (see Belfer et al 2017, p.57-58; Maldonado et al 2016, p.113; Rice et al 2015, p.253-254; Routledge et al 2018, p.79). This exclusion is at least partially the result of the construction of climate change as a global, biophysical phenomenon. Such a construction has contributed to the prioritization of de-contextualized, uniform knowledge of the quantifiable biophysical impacts of climate change. Consequently, the lifeworlds and alternative ways of knowing of the peoples whose main concerns involve felt changes in their lived realities – rather than abstract aggregated statistics and mathematical models – are largely disregarded (Allison 2015, p.494-495; Baker et al 2013, p.2508; Brace and Geoghegan 2010, p.286; Heyd 2011, p.28-29; Hulme 2010, p.560-561; Hulme 2017, p.xii-xiii; O'Lear 2016, p.4-5; Smith 2007, p.201; Vedwan and Rhoades 2001, p.109).

Although techno-scientific global models – as developed by transnational scientific institutions – are integral to enhancing our understanding of climate change, its dominance over other approaches (in a search for consensual global knowledge) reduces the vast variety of conceivable solutions and devalues the perspectives of already marginalized groups (Scoville-Simonds et al 2020, p.6). Therefore, greater attention should be paid to the diverging experiences, interests, needs, values, and interpretations of the people who are already experiencing changes in the climate. To these people climate change is an immediate, lived reality that they struggle to respond to (see Allison 2015, p.494; Crate and Nuttall 2016, p.9; Greschke and Tischler 2015, p.8; Haden et al. 2012, p.1; Hastrup and Rubow 2014, p.4; Hulme 2009, p.330; Hulme 2010, p.560; López et al 2017, p.30; Scoville-Simonds 2018, p.357; Stensrud 2016, p.78). This recognition is expected to complement techno-scientific research with a more contextualized understanding of climate change, and the development of more inclusive and contextually appropriate climate change response policies that reflect campesino interests, needs and values (see Belfer et al 2017, p.57-58; Ramos-Castillo et al 2017, p.2; Whyte 2017, p.1).

Chapter 3: Methodological and Theoretical Framework

3.1 Introduction

This chapter outlines the methodological and theoretical framework applied for the collection and analysis of the data. First, the case-study is introduced. Second, the approach consisting of the four axioms (perception, values, knowledge, and response) – as identified by Roncoli et al (2016) – is outlined, which constitutes the main framework for the analysis of the data. Third, the various methods used for the collection of the data are described. Finally, the larger theoretical framework is briefly discussed.

3.2 Case-Study

A total of seventeen interviews[2] were conducted in seven parishes in three provinces in the Andean highlands of Southern Ecuador: the provinces of Cañar, Azuay and Loja. It concerns the following parishes in the province of Cañar: El Tambo (El Tambo canton), Honorato Vásquez (Cañar canton, San Pedro community), Jerusalén (Biblián canton), and Guapán (Azogues canton, Agüilán community). In the province of Azuay, interviews were carried out in the parishes of Chiquintad (Cuenca canton) and Ricaurte (Cuenca canton). Finally, one interview was conducted in the parish of Catacocha (Paltas canton) in the province of Loja (see fig. 1). The altitude in the Southern highlands of Ecuador is highly variable ranging from around 2.500 to 4.500 meters above sea level, contributing to a large variability in climate conditions within the region. These differences in altitude and climate conditions can even be observed within the boundaries of a single parish. The soils in the Southern Andes of Ecuador are highly susceptible to erosion, and its productivity is below the national average (Cisneros et al 1999, p.3).

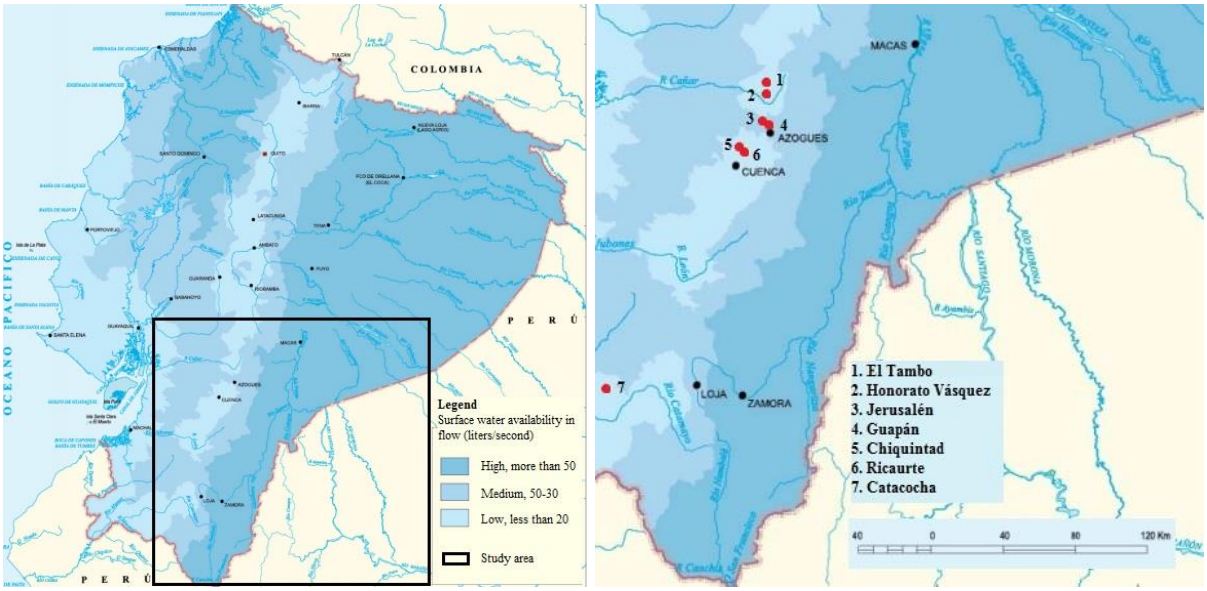

Fig. 1: Approximate locations of the seven parishes in the South of Ecuador (after IGM 2013, p.174).

According to the development plans, as outlined by the decentralized autonomous government of the selected parishes (GAD 2014-2016), the following crops are commonly cultivated in the Andean highlands of Southern Ecuador: potato (*Solamun tuberosum*), melloco (*Ullucus ullucus*), oca (*Oxalis tuberosa*), mashua (*Tropocolum macus*), beans (*Vicia faba*), barley (*Ordeum vulgare*), maize (*Zea mays*), wheat (*Triticum aestivum*), and peas (*Pisium sativum*). Furthermore, various vegetables and fruits are cultivated, such as carrots (*Daucus carota*), cabbage (*Brassica oleracea*), tomatoes

(*Lycopersicum esculetum*), strawberries (*Fragaria ananassa*), and babaco (*Carica pentagonia*). Animal husbandry in the Southern highlands mainly consists of the keeping of cattle, pigs, sheep, guinea pigs, and chickens (GAD 2014-2016). The interview participants note that they are engaged in the cultivation of a mixture of the following crops: maize, potato, beans, barley, melloco, oca, peas, yuca, plantain, oats, cabbage, garlic, tree tomato, tobacco and various fruits. In regards to animal husbandry, the participants raise cattle, guinea pigs, and/or chickens. Various participants are, additionally, engaged in other forms of income generation, such as wood working, cleaning, and driving a taxi. Moreover, three of the research participants function as elected president of the irrigation system in their respective community.

The irrigation systems that the research participants make use of fall under public ownership. In the province of Cañar, the construction, administration, operation and maintenance of the irrigation systems are largely carried out by the provincial decentralized autonomous government (GAD), in which the users are represented by an elected president from the community. In the selected parishes in the provinces of Azuay and Loja, these responsibilities are largely transferred to the users in the form of user boards or user associations. Most of the irrigation systems in the parishes consist of open canals, which are used to transport water from rivers to the irrigation zone (see fig.2). The water is distributed among its users through fixed rotation. The research participants predominantly apply gravity-fed surface irrigation, while a few participants irrigate the fields through a sprinkler system.

Fig. 2: Irrigation canal in Honorato Vásquez (photo taken by author).

The sample of interview participants consists of five campesinos who self-identify as indigenous, and twelve who self-identify as mestizo. It includes six women, and eleven men. The year of birth of the participants ranges between 1943 and 1995. The majority of the participants were in their childhood only able to partake in primary school. Limited schooling is ascribed to a lack of financial capital (see fig.3). It cannot be attested whether the number of indigenous participants in the sample is representative of the region, as estimates of the number of indigenous peoples in Ecuador range from

around 1/3 to 1/10 of the population due to the differences in – and complexity of – definition and measurement, which is frequently influenced by political interests (see Kronik and Verner 2010a, p.3; Lucero 2008, p.150). In the visited parishes the number of women is commonly higher than the number of men, which is not reflected in the sample (see GAD 2014-2016). A limited number of women were interviewed as women more frequently showed that they were uncomfortable with the idea of an interview, noting that they were afraid that they would not be able to answer the interview questions. Furthermore, the sample includes a limited number of individuals below thirty years old, which is not reflective of the demographic statistics of the region (see GAD 2014-2016), but does increase the chances that the participants are able to discuss the presence or absence of long-term changes in the climate due to living in the region for a longer period of time. Finally, the schooling of the research participants is representative of the region (see GAD 2014-2016).

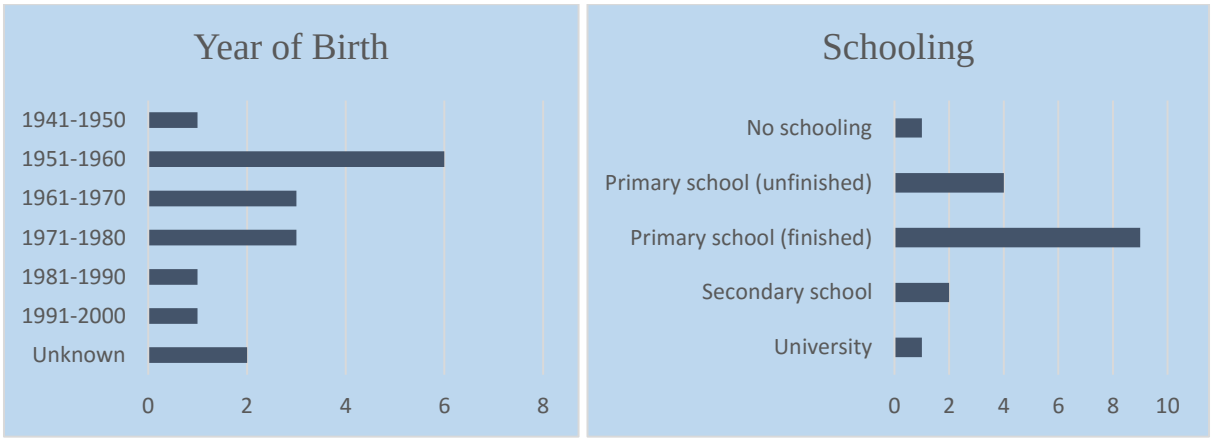

Fig.3: Year of birth (left), and schooling (right) of participants.

3.3 Approach

The research problem is approached by means of four interrelated axioms: perception, values, knowledge, and response. These axioms are identified by Roncoli et al (2016) – based on a literature review – as the main axioms through which human engagements with changes in the climate are studied. Previous studies on human engagements with changing climate conditions have largely placed exclusive focus on one axiom. No study has been found that addresses all four of the axioms, and – as such – the interrelatedness of the axioms remains understudied. It is essential to engage with all four of the axioms in order to develop a greater understanding as to why certain responses are considered appropriate in different contexts. For example, a study of response without a consideration of perception is inadequate for such a study tends to involve an implicit assumption that people respond to the changes in the climate as detected by technical-scientific models, which might not correspond to the changes in the climate as detected through experience (see e.g., Murtinho 2016). It is, therefore, important to investigate the axiom perception in order to identify the changes that people are actually responding to. For these reasons, the four axioms are combined to constitute the approach employed in this research. It should be noted that the four axioms are differently defined in my research in comparison to the research carried out by Roncoli et al (2016) for reasons of clarity[3]. It is described below how the four axioms are understood in this research.

The first axiom, perception, refers to the observation or detection of changes in the climate, in which the human body's senses constitute a key medium through which these changes are experienced (see Roncoli et al 2016, p.88). The second axiom, values, refers to what matters most to an individual and/or group. Values determine what people consider to be worth preserving and achieving, and as

such influence what changes are considered to be harmful and what changes require a response (O'Brien and Wolf 2010, p.232; Reid et al 2014, p.403). In the discussion on values, the focus is placed on the principle of Buen Vivir (an alternative to development that emphasizes living well together, and not better on an individual level) (see Thomson 2011, p.451), assigned environmental values, and the construction of human-environment relations. The third axiom, knowledge, is concerned with the systems of monitoring, documenting, communicating, and learning about relations among human and non-human beings, which constitutes a framework through which the perceived changes in the climate are understood (Whyte 2017, p.157). In the chapter on knowledge, the focus is placed on what the participants consider to be the causes of the perceived changes in the climate. The final axiom is response, which is concerned with the strategies that individuals and/or groups undertake or propose to undertake in order to respond to the observed changes in climate conditions, which is expected to be largely determined by the perception, values, and knowledge related to these changes.

The four axioms are directly related to the research questions mentioned in the introduction, and the division of the chapters. Surely, there are more axioms that can influence the manner in which individuals and/or groups choose to respond to changes in the climate. For example, various conditions (e.g., political, social and financial conditions) can significantly limit the number of options available in order to respond to changes in the climate. However, the aim here is to understand what the participants consider to be appropriate and effective options of response (i.e., the strategies that they wish would be undertaken), which is not expected to be significantly influenced by the above-mentioned limiting conditions, but these conditions may hinder the implementation of the strategies that the participants wish to employ.

3.4 Research Methods

The main research method used for data collection were semi-structured interviews (involving an interview guide with questions concerned with the four axioms), which were conducted in Spanish[4] in February 2020. The interviews were audio-recorded (with informed verbal consent from the interviewees) and transcribed verbatim. At the beginning of the interviews, information was provided to the interviewees regarding how the collected data is used. For example, it was stated that: 1) I am interested in their experiences with challenges related to the climate, 2) the research is conducted for my Master thesis, 3) the data is published online, and 4) their answers to the interview questions are anonymous. The participants were, furthermore, assured that if they cannot or do not want to answer a question, it is not a problem. In the interviews, the term climate change was avoided until the end of the interview in order to not lead the discussion in one direction, and in an attempt to use the terms and expressions that the interviewees employ (as is similarly done by Crate 2008, p.582 and Rasmussen 2016, p.77).

Interviews lasted between fifteen minutes to one hour, depending on the time available to the participants, and were conducted in the interviewee's location of choice (e.g., in their house, in their garden, on the street, in front of a church, or in a car). Quotes from the interviews used in the following chapters were translated to English by the author. The data collected in the interviews was analyzed through a thematic analysis, in which the transcribed text was grouped into main themes (e.g., perception, values, knowledge, and response) and sub themes (e.g., for knowledge a sub theme is deforestation). Contact with the interviewees was made in various ways. In the province of Cañar, engineers from the department of irrigation and drainage of the provincial government of Cañar allowed me to join them in their field visits to various communities. In the province of Azuay, I joined the team of Dr. A. M. Avilés from the University of Cuenca in their field visits, while in the province

of Loja, contact with the interviewee was made through the agricultural association Agropisa. Interviewees in the various parishes were selected randomly based on whoever was nearby, although some effort was made to make the number of men/women and indigenous/mestizo as equal as possible.

3.5 Theoretical Framework

The theory used for the analysis of the data is discussed in more detail in the following chapters as each axiom requires different theories. Therefore, in this chapter, the overall theoretical framework is only briefly described. There are three recurrent theoretical assumptions, which refer to: 1) the interrelation between the four axioms; 2) the construction of human-environment relations; and 3) the experience of changes in the climate.

First, it is expected that the axioms perception, values, and knowledge have significant influence on what are considered to be appropriate and effective strategies of response to changes in the climate. The participants are expected to respond to the changes that they detect in their environment (referring to perception) (see e.g., Adger et al 2009, p.350; Arbuckle et al 2015, p.208; Morton et al 2017, p.18-19). These changes are expected to only elicit a response if the observed changes in the climate negatively impact what matters to the participants, as the goal of responding to changes in the climate is "to protect that which we value" (referring to values) (see Hartzell-Nichols 2011, p.690). The options of response undertaken and proposed by the participants are expected to be directly related to what are considered to be the causes of the perceived changes in the climate (referring to knowledge). For example, if deforestation is considered to be a cause of changes in the climate, the participants can be expected to consider reforestation a potentially effective response.

Second, human-environment relations are – throughout the chapters – considered to be socially constructed. In other words, the human/non-human, culture/nature, and animate/inanimate dichotomies do not exist a priori, but are relationally brought into existence or constructed. These dichotomies should, therefore, not be projected onto people and places where they do not exist (see Barad 2003, p.818-828; Descola 1996, p.82). In order to not impose these 'western' dichotomies, the term environment is used (instead of nature), which recognizes the embeddedness of humans in the environment, and does not necessarily construct a strict boundary between humans (or culture) and nature. Additionally, insight is drawn from the concept of 'weatherworld', as developed by Ingold (2005), to challenge the nature-culture (or nature-human) dichotomy. This concept places emphasis on humans as embedded in (or actors in) the weather, climate, and environment, rather than seeing these as external objects of perception (see Ingold 2007, p.S19; Knebush 2008, p.246).

Third, the focus is placed on the human experience of changes in the climate, instead of on climate as a global phenomenon of aggregated statistics, in order to allow for the recognition that campesino perspectives can provide insight regarding climate change. Climate change as a global phenomenon may not be visible (i.e., detectible by the naked eye), but certain aspects can be made visible through its tangible features and/or through external knowledge of it (see Knebusch 2008, p.248; Rudiak-Gould 2013, p.128). Therefore, throughout my research, the phrase 'changes in the climate' (or 'changes in weather patterns' or 'changes in climate conditions') is used, instead of 'climate change', to refer to the experiences of the research participants. Moreover, throughout the following chapters, I will not make any remarks regarding the 'accuracy' of the statements made by the interviewees on – for example – the detection of changes in the climate or the causes of perceived changes in the climate, as such an endeavor remains fraught with political challenges because of the power-laden relations in which knowledge is embedded (see Cameron 2012, p.105; Latulippe 2015, p.4; Nadasdy 1999). I am in no position to make such statements regarding 'accuracy' nor is it relevant for the purpose of this

study. I am interested in the perspectives and experiences of the participants, not in the 'accuracy' of these perspectives (i.e., whether it corresponds to the dominant form of knowledge). This is particularly important considering I am from a country that has partaken in the colonization of parts of Latin America and the Caribbean, which has resulted in power imbalances that continue to negatively affect campesinos in this region.

Chapter 4: Perception

4.1 Introduction

The first axiom, perception, refers to the observation or detection of changes in the climate, in which the human body's senses are an important medium through which the particular manifestations of fluctuations in weather patterns (e.g., rain, wind and temperature) are experienced[5] (see Roncoli et al 2016, p.88). An understanding of campesinos' perceptions of changes in the climate is important for various reasons. First, such an understanding can contribute to our knowledge of the local manifestations of climate change (Roncoli et al 2016, p.91), as people who are engaged in agricultural activities are expected to be closely aware of changes in weather patterns. The weather animates and is engrained in campesinos' daily lives due to daily interactions with the environment and a dependency upon the environment for their livelihoods (see Ramos et al 2011, p.249; Vaddhanaphuti 2017, p.2). Secondly, campesinos' perceptions of changes in the climate are integral to developing an understanding of proposed and undertaken responses to the local manifestations of climate change, as they are expected to predominantly respond to the changes that they themselves detect, rather than changes detected by techno-scientific models (see Adger et al 2009, p.350; Alessa et al 2008, p.154; Arbuckle et al 2015, p.208; Berkes and Jolly 2001, p.12; Bryan et al 2013, p.30; Morton et al 2017, p.18-19; Pyhälä et al 2016, p.4; Rhoades 2006, p.73; Sánchez-Cortés and Chavero 2011, p.305; Vedwan and Rhoades 2001, p.109). Finally, campesinos' perceptions of changes in climate conditions are expected to reflect their particular concerns, which are essential in identifying strategies to respond to changes in the climate that are responsive to local realities (Byg and Salick 2009, p.156).

The aim of this chapter is to identify the changes in the climate that the research participants have detected. First, the results from previous studies on the detection of changes in weather patterns in the Andean region are briefly described. This is followed by a discussion of theoretical questions regarding the experience of the weather, the climate, and its changes. Finally, the data from the interviews is discussed in relation to these theoretical questions.

4.2 Previous studies

Perceptions – by the naked senses – of changes in the climate remain largely overlooked in studies on global environmental change, and are particularly limited in the Andean region, as shown in a literature review conducted by Pyhälä et al (2016, p.11; see also Byg and Salick 2009, p.157). Nevertheless, a few studies that consider detections of the local manifestations of climate change in the Andean region are identified. It includes two studies from Peru (López-i-Gelats et al 2015; Scoville-Simonds 2018), three studies from Bolivia (Boillat and Berkes 2013; McDowell and Hess 2012; Meldrum et al 2018), and three studies from Ecuador (DePaoli 2011; López et al 2017; Rhoades 2007).

The research participants in the above-selected studies observed changes in climate conditions evidenced by increased temperatures (Boillat and Berkes 2013, p.4-5; DePaoli 2011, p.175; McDowell and Hess 2012, p.347-348; Meldrum et al 2018, p.712-713; Scoville-Simonds 2018, p.349-351), heat and cold extremes (López-i-Gelats et al 2015, p.277; Scoville-Simonds 2018, p.349-351), unpredictable weather patterns due to increased climatic variability (e.g., irregular rain, hail and frost events) (Boillat and Berkes 2013, p.4-5; DePaoli 2011, p.175; López et al 2017, p.38; McDowell and Hess 2012, p.347-348; Meldrum et al 2018, p.712-713; Rhoades 2007, p.45; Scoville-Simonds 2018, p.349-351), a delayed and/or shorter rainy season (DePaoli 2011, p.175; McDowell and Hess 2012, p.347-348; Meldrum et al 2018, p.712-713), decreased annual precipitation (Boillat and Berkes 2013, p.4-5; McDowell and Hess 2012, p.347-348; Rhoades 2007, p.45), stronger winds (Boillat and Berkes

2013, p.4-5; Rhoades 2007, p.45), and the proliferation of pests (Boillat and Berkes 2013, p.4; López et al 2017, p.40-42; McDowell and Hess 2012, p.347-348; Meldrum et al 2018, p.713). Most of the selected studies suggest that the research participants clearly detected unequivocal changes in climate conditions. Only Scoville-Simonds (2018, p.349) notes that there was no sufficiently consistent agreement among the participants to conclude that the members of the community under study "are experiencing climate change impacts", as various participants reported that the climate conditions improved or remained unchanged.

Techno-scientific data of changes in climate conditions in the Andean highlands (as produced by transnational institutions) is in accordance with the results from the above-mentioned selected studies. Based on such data, various expected impacts of climate change are identified in the Andes. These include: predicted rising mean temperatures of 4.5 to 5°C by the end of the century, changes in precipitation patterns, more frequent extreme weather events (e.g., hailstorms, frosts, droughts), decreased predictability of seasonal variations, and changes in biodiversity patterns (Coudrain et al 2005, p.931; Feo et al 2009, p.85; Saxena et al 2016, p.2-3; Zoomers 2010, p.156). It should be noted that the models developed to predict climate change patterns in the Andean highlands include various uncertainties, and the exact nature and magnitude of the effects of climate change are expected to significantly vary due to the high bio-geophysical heterogeneity of the Andes (Buytaert et al 2010; López et al 2017, p.31; Skarbø and VanderMolen 2014, p.28).

The above-mentioned techno-scientific data on climate change is not used here to determine 'accuracy', as is already explained in the previous chapter. Perceptions of the local manifestations of climate change might not correlate with such data, but these perceptions cannot be 'inaccurate' as 'climate change' is a social construct (i.e., it may be differently defined by different social groups) (Meze-Hausken 2004, p.27; Stehr and Storch 1995, p.101). Instead, techno-scientific data is described above for two reasons: 1) it can reveal which changes campesinos can be expected to perceive, and 2) this data may have been communicated to campesinos through the media, and – as such – can influence their perceptions of changes in weather patterns.

4.3 Experience

4.3.1 Defining the Weather, the Climate, and its Changes

The International Panel on Climate Change (IPCC), which is widely considered to constitute the "authoritative voice of climate change knowledge" (Hulme and Mahony 2010, p.713; see also Hulme 2010, p.561), defines climate as follows: "the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years." Climate change is defined as "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer" (IPCC 2014, p.119-120). These definitions predominantly portray 'climate' and 'climate change' from a quantitative perspective, in which the focus is placed on statistical data – instead of the senses and memory – of different variables over an extended period of time, while often evoking large geographical and temporal scales. In this manner, 'climate change' is made to be too abstract to be perceived by the naked senses, and denies any relation to everyday life and/or personal experience (Abbott and Wilson 2015, p.46; Baron and Petersen 2015, p.1148; Heymann 2019, p.1549; Knebusch 2008, p.248; Macnaghten 2003, p.71-72; Strengers and Maller 2017, p.1435). On the contrary, the weather and its changes are largely described as a local phenomenon of instantaneous changes, which can be experienced immediately through the body's senses (Baron and Petersen 2015, p.1148; Strengers and Maller 2017, p.1435; Vaddhanaphuti

2017, p.11). These conceptualizations of the climate, the weather, and its changes reveal the construction of various dichotomies: global-local, quantitative-qualitative, and recorded-experienced.

Dichotomies should not be considered as prior, but need to be questioned for they are usually constructed to aid certain agendas. The three dichotomies mentioned above, related to the larger weather-climate divide, are tenuous for various reasons. First, the dichotomies deny the validity of people's experiences with changes in the climate by placing exclusive power to determine what climate change is within a global institution like the IPCC, or with natural scientists in general, who have access to long-term datasets, computer models, and the techniques to analyze statistical data (Akerlof et al 2013, p.82; Heymann 2019, p.1549; Hulme 2015, p.8; Jasanoff 2010, p.233; Rudiak-Gould 2013, p.122; Vaddhanaphuti 2017, p.12-13). Climate change could have been called 'long-term weather change', or 'pervasive' or 'multi-sited' rather than 'global', which would have made the phenomenon more accessible to the lay observer without sacrificing empirical accuracy (Rudiak-Gould 2013, p.123). Second, the weather and the climate are intimately connected to each other as the weather is the manifestation of the climate in a particular locality in the present moment (Vet 2013, p.198). In the Spanish language, the term *el clima* (or *la clima* depending on geographic location) is commonly used to denote both weather and climate (see Rasmussen 2014, p.233). Third, if the climate (and its changes) are only understood as aggregated statistics, then crucial aspects regarding how the climate and humans are mutually shaping and changing each other are left out. The above-mentioned dichotomies appear to fall within the larger nature-culture (or nature-human) dichotomy (Hulme 2017, p.5). Thus, although there is a practical desirability for maintaining a distinction between the weather and the climate, this should not lead to strict dichotomies and a disregard for connections between the two phenomena. The distinction needs to be loosened in order to allow for the recognition that changes in the climate can be made palpable in the everyday, and that campesinos can provide insight regarding climate change (see section 4.3.2) (Neimanis and Walker 2014, p.562).

Then, how can we understand the weather, the climate, and its changes in a way that does not adopt separatism as prior and allows for a consideration of the contribution of people's experiences with changes in the climate? First, the concept of 'weatherworld', as developed by Ingold (2005), is potentially useful for challenging the overarching nature-culture (or nature-human) dichotomy, and to allow for human experience to be recognized as valuable in climate change research. Ingold (1993, p.154) argues that nature is not 'out there', but humans are embedded in (or dwell in) nature (or the environment). Nature is a part of the social (or human) realm, just as the social realm is part of nature (see also Ingold 2011, p.95). The nature-culture dichotomy has similarly been criticized by other scholars for frequently being uncritically imposed on societies where it does not exist, including indigenous societies in the Americas (Descola 1996; see also Plumwood 2002). Most of the research participants likewise do not maintain a strict dichotomy between humans and nature (as is further discussed in chapter 5). The implications of deconstructing the nature-culture dichotomy for conceptualizing the weather (and the climate) is that the weather (and the climate) can neither be conceived of as a scenic panorama 'out there'. Instead, we act in the weather(world) (or the climateworld), as "to feel the wind is not to make external, tactile contact with our surroundings but to mingle with them" (Ingold 2007, p.S19). Similarly, Knebush (2008, p.246) argues that the weather and the climate are not experienced from a particular 'view point'. The weather is not strictly an object of perception, but – rather – a medium of perception as we perceive in the weather, because "as the weather changes we do not see different things, but we do see the same things differently" (Ingold 2005, p.102). Moreover, the weather influences our 'movements of actions', while the climate orients our everyday practices (Ingold 2005, p.103; see also Strengers and Maller 2017, p.1437). For example, we might alter our posture if there is a heavy wind, and wear different types of clothing depending on the season. This effect is further well-exemplified by a quote from one of the interviews: "The day

begins with the falling of the rain, we have to run to the house. Sometimes, it is very sunny, then we have to enter to be in the shadow, take something to drink" *("El día comienza al caer el agua, tenemos que correr a la casa. A veces hace mucho sol, entonces entramos para estar a la sombra, tomar algún líquido"*) (Guapán, Mestizo, W, 1956)[6].

Second, the weather-climate and nature-culture dichotomies can be deconstructed by means of the manner in which Hulme (2017) conceptualizes their relation. Hulme (2017, p.4) argues that 'climate' should be understood as a construct that mediates between the human experience of fleeting weather and the structured ways of living that are informed by this experience. Knebush (2008, p.244) describes 'climate' in a similar manner as a relationship that is progressively established between humans and the weather. The human construction of climate allows for a sense of stability or normality to be brought to the chaotic experience of unpredictable weather, and is the reason why the weather might fail to meet people's expectations. Expectations are shaped by what is considered to be the climate, as the climate determines what the weather 'should be' at a certain time in a particular place. These expectations (and people's understandings of the climate) are the result of accumulated experiences of weather movements and patterns, which are held in social or individual memory (and/or are determined by a statistical standard), and used to bring order to the chaotic weather (Hulme 2017, p.4-5; see also Vaddhanaphuti 2017, p.11; Vianni et al 2012, p.367-370). In other words, the climate can be understood as the "expectation of weather" (Hulme 2017, p.4-5). Hulme (2017, p.5) identifies the ordering function of the climate as one of the reasons why the idea of the climate changing can be so unsettling, as it undermines people's trust in the climate to behave a certain way: to be consistent and to be predictable. In this manner, people lose the largescale orderliness of the climate that is supposed to ease people's anxieties about the weather (Hulme 2017, p.5; see also Stehr 1997, p.165-167).

4.3.2 Can We Perceive Climate Change?

Rudiak-Gould (2013) identifies two sharply divergent answers to the question whether the phenomenon of climate change can be detected firsthand with the human senses, unaided by techno-scientific instruments (i.e., whether climate change is 'visible'). The answers to this question reveal a politically-charged dispute between 'visibilists' and 'invisibilists'. Invisibilists argue that climate change is inherently undetectable by the human senses as the phenomenon is considered to be too big (i.e., global) and too slow (i.e., occurring over large temporal scales) to be visible (Rudiak-Gould 2013, p.120-123). Climate change is conceived of as a statistical concept constituted by the aggregation of long-term, precise measurements (see def. above by IPCC 2014, p.119-120; Akerlof et al 2013, p.82; Greschke 2015, p.126-127), and – as such – climate change cannot be experienced directly by the lay observer (Goebbert et al 2012, p.132; Mormont and Dasnoy 1995, p.49; Rudiak-Gould 2013, p.120-123). On the contrary, visibilists argue that climate change is not only visible to the lay observer, but is already being seen (Rudiak-Gould 2013, p.120). For example, Tauli-Corpuz and Lynge (2008, p.4) argue that "in living off the land and gaining knowledge through their relationship with the land, indigenous peoples have been observing the effects of global warming first-hand for several decades." A lifetime of experience in a particular locality is considered to make climate change readily apparent to the human senses (Rudiak-Gould 2013, p.126). To a certain extent the dispute is simply a matter of how the term 'visible' and 'climate change' is defined: people can see the impacts of climate change, but not its causation, and – as such – cannot ascertain that the changes they observe are the result of climate change (Rudiak-Gould 2013, p.120). However, the dispute is not only a matter of definition, but also of politics, reflecting a larger debate between two positions regarding the role of expertise in society: who has the authority to speak about climate change and who does not? (Rudiak-Gould 2013, p.129).

Rudiak-Gould (2013, p.128-129) offers a compromise between 'visibilism' and 'invisibilism', which is termed 'constructed visibilism.' Constructed visibilism argues that climate change is neither inherently visible, nor inherently invisible, but certain aspects can be made visible by means of its tangible features and/or through external knowledge of it (Rudiak-Gould 2013, p.128; see also Akerlof et al 2013, p.82; Fernández-Llamazares et al 2015, p.308; Linden 2014, p.430). For example, a person can easily note glacier retreat based upon a comparison of photographs or memories of the past and the present situation, but a person cannot look up to the sky and notice ozone depletion happening (Rudiak-Gould 2013, p.128). Climate change is a complicated phenomenon – "encompassing origins, causation, present impacts, possible effects, and a host of related issues" – of which not all aspects are visible, but certain aspects can be made visible (Rudiak-Gould 2013, p.128). In a similar manner, Knebusch (2008, p.248) argues that the direct experience of climate change is problematic, as we do not experience climate change in its technical-scientific sense, but we can detect changes and/or fluctuations in the climate. Therefore, throughout my research, I use the phrase 'changes in the climate' (or 'changes in weather patterns' or 'changes in climate conditions'), instead of 'climate change', to refer to the perceptions of the research participants[7]. This is considered to be a more open and inclusive formulation. Not all of the participants are familiar with the term climate change, and – as such – when they speak of changes in the climate, they are not speaking of the technical-scientific concept of climate change. These changes only become climate change when the participants or I make that connection (some of the participants do make that connection, which is further discussed in chapter 6) (see Greschke and Tischler 2015, p.7).

4.4 Case-Study

During the interviews the research participants were asked questions regarding the climate according to different time frames: the past, the present and the future. Research participants were first asked to describe the climate in the past (i.e., during their childhood)[8] as they remember it, then to describe the climate in the present as they experience it (and if they had observed any changes), and finally the climate in the future as they imagine it to be. Although the interview questions were structured neatly into these different time frames, the research participants did not speak about the perceived changes in climate conditions in such a manner. The interviewees spoke of the recent weather, about the rain today and during the past month, and moved easily into changing conditions over the years and across generations. When asked descriptive questions about the climate in the past, many of the participants already mentioned the changes in weather patterns that they had perceived. In fact, all the research participants noted changes in weather patterns. For most of the respondents it is clear: "The climate has changed so much" ("*Ha cambiado tantísimo el clima*") (Catacocha, Indigenous, M). Another participant reiterates: "The climate used to be quite different" ("*El clima era bastante diferente*") (Ricaurte, Mestizo, M, 1952)[9]. However, a few research participants note that the climate was the same in the past as it is today, but did notice long-term changes in weather patterns (e.g., precipitation and temperature) when asked more specific questions regarding certain weather phenomena. It is possible that the term 'climate' is not commonly used by these participants in their daily lives when talking about weather fluctuations. The research participants detected the following changes in climate conditions: increased temperatures (along with a proliferation of pests), reduced annual precipitation, and an increased irregularity and decreased predictability of seasonal patterns.

4.4.1 Perceived Changes in Temperature

The research participants detected an increase in temperature, as one of the respondents states: "It seems that it used to be colder. Now it is not so cold anymore. Nowadays, I see and feel those sunrays. When I was younger, it was not like that" ("*Parece que era más frío. Ahora ya no es tanto más frío.*

Hoy en día yo veo y siento esos soles. Cuando yo era niña, no era como así") (Jerusalén, Indigenous, W, 1977). Another participant similarly notes: "I think that it used to be colder here. It changed abruptly, it is hotter" ("*Pienso que era más frío aquí. Se cambió bruscamente, hace más calor*") (Guapán, Mestizo, M, 1962). The higher temperatures are equated with stronger solar radiation. For example, one of the participants states: "The sun rays are very strong, they burn. It was not like this in the past" ("*Los rayos solares son muy fuertes, que queman. Antes no era así*") (Honorato Vásquez, Mestizo, M, 1969). Another respondent reiterates this sentiment: "The sun, how much it is here now, is a barbaric thing: there is a lot of heat and it burns, it burns, it burns, it can no longer be endured" ("*El sol cuanto hace aquí ahora es una cosa bárbara: hay mucho calor y quema, quema, quema, que ya no se sopórtalo*") (El Tambo, Mestizo, M, 1954).

The sudden need for protection against the sun is used to verify the perceived increase in temperature. One of the participants states: "Nowadays, if you go outside without a hat, without anything, my God, the sun is like burning one" ("*Hoy en día, si usted sale a la calle sin sombrero, sin nada, dios mío, el sol es como quema uno*") (Jerusalén, Indigenous, W, 1977). Another respondent likewise notes: "Now we have to use sunscreen, we always have to wear a hat, we have to protect ourselves" ("*Ahora tenemos que usar cremas para el sol, tenemos que andar siempre con un sombrero, tenemos que protegernos*") (Catacocha, Indigenous, M).

The perceived increase in temperature is, additionally, corroborated by various childhood memories. One of the participants states: "The climate was much colder before. My parents did not want to send us there [about two kilometers up], saying that you are going to die from the cold, because the hail fell, the snow fell. Now the snow does not fall like that anymore" ("*El clima era mucho más frío antes. Mis papás no querían mandarnos allá [unos dos kilómetros arriba], diciendo que van a morir de frío porque caía la helada, la nevada caía. Ahora ya no cae la nevada así*") (El Tambo, Mestizo, M, 1954). Similarly another participant refers to a memory of when she used to walk to school: "There was fog. Now there is no more. When I was going to school, there was a lot of mist that was falling down, I did not see anything ahead" ("*Había neblina. Ahora ya no hay. Yo cuando me iba a la escuela, había mucha neblina que iba llorando, yo no veía nada adelante*") (Guapán, Mestizo, W, 1956). Another interviewee reiterates this sentiment with a memory of the clothing people used to wear: "Before it was much colder. My parents had sheep leather that had been given with ponchos for the cold, but now it does not happen like that, it is no longer cold" ("*Antes era mucho más frío. Mis papas tenían cuero de borregos, eso han dado con ponchos para el frío, pero ahora ya no pasa así, ya no hay frío*") (Honorato Vásquez, Mestizo, M, 1969).

The higher temperatures are considered to have an adverse effect on human health. For example, one of the participants argues: "Sometimes the immense sunrays bring headaches" ("*A veces los inmensas soles llevan dolor de cabeza*") (Chiquintad, Mestizo, W, 1980). Another respondent argues that the higher temperatures contribute to an increase in incidences of the flu: "It is a sun that is unbearable, people cannot bear. That is why the flu comes. People get sick from changes of the climate" ("*Hace un sol que es insoportable, la gente no soporta. Por eso vine las gripes. La gente enferma por los cambios del clima*") (El Tambo, Mestizo, M, 1954). The research participants, additionally, argue that the increase in temperature has contributed to the proliferation of insect plagues: "There are bugs that you do not know. Those bugs eat the plants and then they die" ("*Hay bichos que no conoce. Esos bichos se comen las plantas y ya pues se mueren*") (Chiquintad, Mestizo, W, 1980). Another respondent similarly notes: "There used to not be so many pests. The mosquito, just as there is the pest that is the weevil, does not leave us alone" ("*No había tantas plagas. El mosquito, igual que existe el plaga que es el gorgojo, no nos deja en paz*") (Ricaurte, Mestizo, M, 1952).

4.4.2. Perceived Changes in Quantity of Precipitation

The research participants note a trend towards a decrease in the amount of annual precipitation, as one of the respondents states: “Before it rained more. Now the years have changed. It does not rain much, it rains very little” (“*Antes llovía más. Ahora los años ha cambiado. No llueve mucho, llueve muy poco*”) (Catacocha, Indigenous, M). Another participant notes that they are waiting for the rain to come: “Right now we are already without rain for about three months. Then everything that is reservoirs and sources are drying up. We are without water, we are waiting: hopefully it appears, is it going to rain?” (“*Ahora mismo estamos ya sin lluvia como unos tres meses. Entonces ya todo lo que son reservorios y fuentes se van secando. Estamos sin agua, estamos esperando: ojalá aparezca, va a llover?*”) (Honorato Vásquez, Mestizo, M, 1969).

It is emphasized that the quantity of rainfall experienced by the participants is not normal: “Before it rained hard, it was stronger. It rained a lot, a lot of water came down from the hills. Now it will not happen normally like this. There is not much rain now” (“*Mas antes llovía duro, era más fuerte. Llovía mucho, bajaba bastante agua de los cerros. Ahora no habrá pasando normal así como esta. No hay mucha lluvia ahora*”) (Honorato Vásquez, Indigenous, M, 1956). Another respondent similarly notes: “There is less rain now. For example, in this month it rained very little, it is not normal” (“*Hay menos lluvia ahora. Por ejemplo en este mes sea muy poco la lluvia, no es normal*”) (Honorato Vásquez, Mestizo, M, 1982).

The decreased quantity of annual precipitation is evidenced by changes in the quantity of water in rivers, as one of the participants notes: “Before, there were storms that carried the rivers to the bridges. Now those heavy rains do not happen anymore. The rivers are dry right now” (“*Antes había unas tempestades que los ríos iban llevando hasta los puentes. Ahora ya no ocurre esas lluvias tan fuertes. Los ríos están secos ahorita*”) (Guapán, Mestizo, M, 1962). Another interviewee similarly observes: “Before, there was plenty of water. When it rained in the streams, it was a lot of water. Now there is nothing” (“*Más antes había bastante agua. Cuando llovía en las quebradas, era mucha agua. Ahora no hay nada*”) (Honorato Vásquez, Mestizo, M, 1969).

The reduction in the amount of rainfall (in combination with increased temperatures) is further evidenced by changes in the color of grass: “There was a lot of rain and today it is not like that. In this year it has rained little. The farmland is changing color” (“*Había bastante lluvia y hoy en la actualidad no es así. En este año mismo ha llovido poco. La chacrita está cambiando de color*”) (Guapán, Mestizo, W, 1956). Another participant likewise notes: “Three weeks that it has not rained, the pasture was already white, it is already drying. We need rain so the cows can eat” (“*Tres semanas que no llovía, ya estaba el potrero hecho blanco, ya viene secando. Necesitamos lluvia para las vacas pueden comer*”) (Jerusalén, Mestizo, M, 1943).

The decrease in the quantity of annual precipitation has contributed to an overall reduction in the amount of water available to the participants, which is a big concern: “Before, the rivers never dried up, now there is very little water in the rivers. It is a big concern” (“*Antes los ríos nunca secaban, ahora hay poquísima agua en los ríos. Es una preocupación grande*”) (El Tambo, Mestizo, M, 1954). Therefore, many of the participants suggest that the water sources should be better cared for: “At that time there was more water than now. Now there is little water, very little. We will have to take care of the water, because if we do not take care of it, we run out of water” (“*En ese tiempo había más agua que ahora. Ahora hay poca agua, muy poquísima. Habrá que cuidar el agua muchísimo, porque si no lo cuidamos, nos quedamos sin agua*”) (Catacocha, Indigenous, M).

4.4.3. Perceived Changes in Seasonal Patterns

The Andes is characterized by high seasonal variability in precipitation. The region has two defined seasons: a rainy season (winter) and a dry season (summer) (see Borsdorf and Stadel 2015, p.46). The interviews were conducted during the rainy season, in the month of February. Predictable and well-established seasons are critical to smallholder farmers, as the seasons order the timing of the agricultural cycle: seasonal rainfall patterns influence farmers' decisions regarding when to sow and when to harvest, which contributes to the success or failure of crops (see Jennings and Magrath 2009, p.1; Kronik and Verner 2010b, p.151). Therefore, it is worrying that the research participants note that the seasonal patterns as they know them – as they had experienced as 'normal' – have now shifted, and are considered to be unpredictable, suggesting a 'perceived loss of order' (see Hulme 2017; Scoville-Simonds 2018, p.351).

The perceived loss of order in seasonal patterns of precipitation is indicated by the following statement: "[The climate] used to be more stable. We knew for sure that there would be three or four months of winter: January, February, March, April. We knew that during that time it would rain a lot. Instead, now, it is not. There is more instability" ("[*El clima] era más estable. Sabíamos que eran tres o cuatro meses de invierno seguros: enero, febrero, marzo, abril. Sabíamos que ese tiempo llovía bastante. En cambio, ahora, no es. Hay más inestabilidad*") (Catacocha, Indigenous, M). Another participant reiterates this observation: "The winter used to be three months: January, February, March. But now everything has changed, it has totally changed. Now it rains when it wants, hail falls when it wants. There is no fixed time right now. The climate before was a climate so permanent, [a climate] that I know" ("*El invierno era tres meses: enero, febrero marzo. Pero ahora cambiado todo, ha cambiado totalmente. Ahora llueve cuando quiere, caía helada cuando quiere. No hay un tiempo fijo ahorita. La clima antes era una clima tan permanente que yo conozco*") (El Tambo, Indigenous, M, 1955).

The research participants state that it feels like summer due to the lack of rain during the rainy season (note that the interviews were conducted during the rainy season, known as the winter). For example, one of the interviewees notes: "Now there is no fixed month. Now it is changed. These months we are still in the summer, it has not rained" ("*Ahora no hay mes fijo. Ahora es cambiado. Estos meses igual estamos con verano, no ha llovido*") (Honorato Vásquez, Mestizo, M, 1982). Another participant similarly states: "When we were boys, what was winter and what was summer was identified almost clearly. [Now] we have no defined winter, we have no defined summer. It feels like summer" ("*Cuando nosotros éramos muchachos se identificaba casi bien claro lo que era invierno y verano. [Ahora] no tenemos definido el invierno, no tenemos definido el verano. Se está sintiendo el verano*") (Chiquintad, Mestizo, M, 1960).

Moreover, hail/frost events have become less predictable, as one of the respondents notes: "I knew that in December, during Christmas, hail would fall and kill the plant. You had to sow before, so that the plant would not catch the hail. But now, instead, no more" ("*Yo sabía ya que en diciembre, por la Navidad, caía una helada la que mata la planta. En serio, ya tenía que sembrar antes de eso para que no le coja la helada. Pero ahora, en cambio, ya no*") (Honorato Vásquez, Mestizo, M, 1969). Another respondent reiterates this observation: "Now in the summer there are times of frost, it is not known when. Because before they said that in the month of November the frost is seen in June/July, but now you do not know when" ("*Ahora en el verano hay épocas de heladas, sea no se sabe cuándo. Porque antes decían que en el mes de noviembre las heladas ve junio/julio, pero ahora ya no sabe cuándo*") (Chiquintad, Mestizo, W, 1980).

The irregularity and unpredictability of rainfall has a significant effect on the timing of the agricultural cycle. One of the participants notes that they do not know anymore when to sow and when to harvest: "Nowadays, we no longer have defined, when it is [time for] sowing and when it is [time for] harvest. It is because the climate is changing" ("*Hoy en día ya no tenemos definido, cuando es [tiempo de] siembra y cuando es [tiempo de] cosecha. Es porque el clima está cambiando*") (Chiquintad, Mestizo, M, 1960). Another participant likewise notes: "Our parents, they knew when, in which month, to plant the potato, in which month to plant the corn. They knew when it is going to rain, when it is not going to rain. I already knew what day it was going to rain, and it was raining. Before yes, during the rainy season, there was rain, but now nothing, there is none" ("*Nuestros papás, ellos sabían cuándo, en qué mes, se sembraba la papa, en qué mes se sembraba el maíz. Ellos sabían cuándo va a llover, cuándo no va a llover. Yo ya sabía bien cual día va a llover y llovía. Antes si, en la fecha de lluvia, había lluvia, pero ahora ya nada, no hay*") (Honorato Vásquez, Mestizo, M, 1969).

Similarly, the irregularity and unpredictability of hail/frost events has resulted in the interviewees to note that they do not know anymore when to sow: "The harvest time before was a fixed time. Our grandparents knew how to sow, for example, to avoid the hail/frost. The month of December, November, October was frost/hail time, the planting was March, April, and May. Now it is not the same as before" ("*El tiempo de cosecha antes era un tiempo fijo. Nuestros abuelos han sabido sembrar, por ejemplo, evitando la helada. El mes de diciembre, noviembre, octubre era tiempo de helada, el sembraba era marzo, abril, y mayo. Ahora no es igual como antes*") (El Tambo, Indigenous, M, 1955).

The changes in the agricultural cycle have an adverse effect on agricultural production. For example, one of the respondents states: "I sowed on September 29, down here with the corn plants, but I see that they are empty, they are already thick and everything, but they are empty. So if it is not sown on the date that it should be sown, it no longer produces" ("*Yo sembré el 29 de septiembre, acá abajo con las plantas de maíz, pero le veo que están vacías, ya están gruesas y todo, pero están vacía. Entonces si no se lo siembra a la fecha que debe ser sembrado ya no produce*") (Chiquintad, Mestizo, W, 1980). Another participant reiterates this observation: "As a child [the climate] was better than now because they had certain seasons for the cultivation of certain things. Now nothing works. It does not produce that way" ("*De niña [el clima] era mejor que ahora porque se tenía como ciertas estaciones para el cultivo de ciertas cosas. Ahora no funciona nada. No produce así*") (Ricaurte, Mestizo, W, 1995). In the Andean highlands sowing is supposed to be done at a time that ensures that the maturation of the crops coincides with the end of the rainy season (which may be extended through irrigation) (Rasmussen 2014, p.233).

4.4.4 Changes Expected in the Future

The future plays an important role in discussions on climate change, as our actions and understandings in the present are not only affected by our memories of the past, but also by our imaginations of the future. Moreover, these imaginations can reveal the aspects of changes in the climate that are most salient to the research participants. Our imaginations of the future grow from everyday experiences of living in an environment that has been, is and will continue to transform (Baron and Petersen 2015, p.1148-1149; Ingold 2012, p.10; Roncoli 2006, p.85).

Predictions for the future primarily show a concern for a continued reduction in the amount of available water, as one of the participants notes: "We do not know [what changes will happen], I think the water suffered because you see above, the origin, it is not a lot of water. So in time what will happen? Decrease more? I do not know. Well, God willing, it will rain more with time or there will be a drought like now. The water will decrease, I think" ("*No sabemos [qué cambios sucederán], creo*

que el agua sufrió porque usted ve ahorita arriba, el origen, no es mucha cantidad de agua. Entonces, con el tiempo qué va a pasar? Disminuir más? No sé. Pues Dios que dispondrá, lloverá con el tiempo más o habrá la sequía como ahorita. Va a disminuir el agua, pienso yo") (Guapán, Mestizo, W, 1956). Another respondent likewise notes: "What worries me for the future is that there will not be much water anymore. We are running out of water" ("*Lo que a mí me preocupa para el futuro es que ya no va a haber mucha agua. Nos estamos quedando sin agua*") (Catacocha, Indigenous, M). For this reason the participants suggest that action needs to be taken: "If you do not take action on the matter, we go backwards. In a few years we will be without water. We will face serious problems in the future. We have to act now" ("*Si no se toma cartas en el asunto, vamos para atrás. En muy pocos años quedaremos sin agua. Vamos a enfrentar graves problemas en el futuro. Tenemos que actuar ya*") (Guapán, Mestizo, M, 1962).

Decreased water availability is expected to result in hunger and poverty, as one of the participants states: "If we continue with the destruction in the future it would be very unfortunate, but if it is stopped, I imagine that in the future it would reap very good things, but if people continue with this destruction, what remains are hunger and poverty" ("*Si es que seguimos con la destrucción en el futuro sería muy lamentable, pero si es que esto lo paramos, yo me imagino que en el futuro ya cosecharía muy buenos cosas, pero sería si es que se sigue con este destrucción, se queda hambre y pobreza*") (Chiquintad, Mestizo, W, 1980). Another interviewee reiterates this expectation: "We will have no water, not to bathe, not to eat, and not for the cattle. That is what is waiting for us, it is for everyone" ("*No tenemos agua, ni para bañar, ni para comer, ni para los ganados. Eso nos esperante, es para todos*") (Jerusalén, Indigenous, W, 1977).

Moreover, there is a concern for what is left for the next generation: "We will leave our children behind a destroyed planet, without water, without vegetation" ("*Vamos a dejar a nuestros hijos detrás una planeta destruido, sin agua, sin vegetación*") (Catacocha, Indigenous, M). Another respondent reiterates this concern: "We are passengers, our children will remain, our grandchildren will remain. Today I am here, tomorrow I will not be" ("*Nosotros somos pasajeros, nuestros hijos quedarán, nuestros nietos quedarán. Hoy estoy aquí, mañana no estaré*") (El Tambo, Indigenous, M, 1955).

4.5 Conclusion

The aim of this chapter was to identify the changes in the climate that the research participants have detected, which includes the following: increased temperatures, reduced annual precipitation, and an increased irregularity and decreased predictability of seasonal patterns. The increase in temperatures has resulted in an increase in incidences of insect plagues and illnesses (e.g., the flu and headaches). Reduced annual precipitation is evidenced by the drying up of various water sources and changes in the color of grass, and has resulted in an overall decrease in the amount of water available for irrigation. Finally, the increased irregularity and decreased predictability of seasonal patterns in terms of rainfall and hail/frost events has resulted in greater uncertainty regarding the timing of the agricultural cycle. This shows that future research should not only consider changes in the quantity of precipitation, but also changes in the quality of precipitation (i.e., changes in precipitation patterns). These observations largely correspond to the findings of previous studies conducted in the Andes. Predictions for the future primarily show a concern for a continued reduction in the quantity of available water. These findings show that the participants are experiencing changes in the climate, and – as such – certain aspects of climate change are visible to the participants and is raising concerns regarding access to water now and in the future. To some of the participants the changes that they are perceiving are signs of climate change, while others are not familiar with this terminology (as is further discussed in chapter 6).

Chapter 5: Values

5.1 Introduction

The second axiom is concerned with values, which – at its core – refer to 'what matters most' or 'what is desirable' to an individual and/or group[10] (Jax et al 2018, p.23; O'Brien 2009, p.166; Reid et al 2014, p.403; Wolf et al 2013, p.551). A distinction should be made between held values and assigned values. Held values refer to principles or ideas that are considered important (e.g., freedom, collectiveness, or health), whereas assigned values refer to what is considered important about phenomena (e.g., 'water gives me life') (Tschakert et al 2017, p.4). Values determine what is deemed to be worth preserving and achieving, and – as such – serve as standards or criteria to guide and/or motivate action and influence the evaluation of situations and/or events (O'Brien and Wolf 2010, p.232; O'Brien 2009, p.166; Roncoli et al 2016, p.96; Schwartz 2007, p.39; Tschakert et al 2017, p.4; Wolf et al 2013, p.551). Climate change is described as an "inescapably moral and ethical issue," which suggests that research and policy concerned with climate change should take into account values (Posas 2007, p.32; see Adger et al 2011, p.1; Cruikshank 2001, p.390; Folke et al 2011, p.723; Hancock 2019, p.1; Heyd 2008; Merchant 2008, p.22; Powell 2019, p.231; Sponsel 2016, p.133; Vitousek and Beamer 2013, p.64).

There are two main reasons why values should be considered in climate change research and policy. First, how individuals and/or groups respond to climate change is at least partially determined by values, as the aim of responding to climate change is "to protect that which we value." Values establish what constitutes harm and what impacts require a response (Hartzell-Nichols 2011, p.690; see also Adger et al 2013, p.113; Cruikshank 2001, p.390; Heyd 2008, p.87; Wolf et al 2013, p.549). Therefore, an examination of values is expected to contribute to the development of policies that are considered to be legitimate and appropriate by those affected, which can support the successful implementation of those policies (see Leonard et al 2013, p.623; Norton-Smith et al 2016, p.77; O'Brien and Wolf 2010, p.232; Reid et al 2014, p.401; Wolf et al 2013, p.548). Second, attention should be paid to values because potentially conflicting and competing values could form a barrier to effectively responding to climate change (Adger et al 2013, p.114; Klein et al 2014, p.925; O'Brien and Wolf 2010, p.233; Pascual et al 2017, p.8; Wolf et al 2013, p.548).

The aim of this chapter is: 1) to identify the held values related to spiritual and religious affiliations that shape human moral behavior towards the environment[11], 2) to understand the different values that the research participants attribute to certain aspects of the environment (i.e., assigned values), and 3) to investigate how values are impacted by the perceived changes in the climate. First, a brief description is given of previous research on values in relation to climate change in the Andean highlands. Second, the chapter delves into human-environment relations, as constructed by various religious and spiritual traditions present in the research context. Third, the three modes of assigned environmental values are explored, which are: instrumental, intrinsic and relational values. Fourth, various important held values are discussed related to the principle of Buen Vivir, which has been implemented in the Ecuadorian Constitution. Finally, each of these theoretical questions are discussed in relation to the case-study.

5.2 Previous Studies

Values have remained significantly underrepresented in climate change research (see Hulme 2014, p.xii; Pyhälä et al 2016, p.8-9; Reid et al 2014, p.403; Wolf et al 2013, p.548). Studies in the Andes related to values more widely (i.e., not necessarily related to spiritual and religious affiliations) were not found. Nevertheless, two studies from the Andean highlands were found that engage with climate

change in relation to values and/or human-environment relations as part of certain spiritual and/or religious traditions (see Allison 2015; Scoville-Simonds 2018). The first study is concerned with glacial retreat on Mount Ausangate in the Peruvian Andes. Glacial retreat is by the indigenous inhabitants in the area interpreted as the result of human failure to maintain proper reciprocal relations with the animate mountain deities, and – as such – the inhabitants wonder what they did wrong to deserve a limited water flow from the mountain (Allison 2015, p.497). The disruption of the reciprocal relations with the mountain deities potentially portends greater social and spiritual dislocation involving the departure of the mountain deities and/or the end of the world. In response to the changing conditions of the mountain, the inhabitants altered various ritual practices, which is – by the researcher – interpreted as "demonstrating an enlarged ethic of care that values the existence of the glacier" (Allison 2015, p.497).

The second study is concerned with changing climate conditions in Cusco, Peru. In this study, two narratives are identified related to indigenous Andean re-interpretations of Catholic and Evangelical religious traditions. The local Andean Catholic narrative involves a conception of the earth as a nonhuman social person (as 'Pachamama' or 'Santa Tierra'), requiring the maintenance of reciprocal relations between humans and the earth by means of ritual offerings (i.e., 'pago a la tierra'). This narrative considers the changing climate conditions to be the result of human behavior, as humans fail to adequately perform the ritual offerings. The local Andean Evangelical narrative conceives of the earth as an object (i.e., not a subject or a social person), contributing to the belief that God should be respected, not the earth. In this narrative, the changes in the climate are interpreted as a sign of the end of the world, an inevitable part of God's plan (Scoville-Simonds 2018, p.345; 356).

5.3 Religious and Spiritual Constructions of Human-Environment Relations

Religious and/or spiritual traditions can, given their ubiquity in the world, decisively impact how individuals and/or groups experience and respond to climate change (Hulme 2017, p.14-15; Jenkins et al 2018, p.86; Veldman et al 2014, p.3). Religion and spirituality play an important role in shaping people's constructions of human-environment relations. These constructions largely determine moral considerability (i.e., what has moral status), which influences human moral behavior towards the environment (e.g., our sense of duty and responsibility to care for the human and nonhuman). Therefore, these constructions can be expected to influence human responses to changes in the environment (including changes in the climate) (see Hitzhusen and Tucker 2013, p.368-373; Hulme 2009, p.161; Hulme 2017, p.14-15; Lin 2016, p.33-34; Macnaghten and Urry 1998, p.23; Mathez-Stiefel et al 2007, p.70).

According to Descola (1996), there are four modes of personhood through which human-environment relations can be constructed: animism, totemism, naturalism, and analogism (see also Descola 2006; Oliver 2009, p.49). Modes of personhood determine if an entity (human or nonhuman) can be seen and treated as a person (i.e., a subject), which is contextually variable and mutually constituted through social relations and practices with other beings (e.g., things, places, animals, plants, and spirits) (Fowler 2004, p.7). In other words, there is no a priori distinction between the human and nonhuman, nature and culture, or animate and inanimate, nor are beings inherently imbued with a fixed essence, but these distinctions are relationally brought into existence (Barad 2003, p.818-828; Escobar 2012, p.31; Groleau 2009, p.399; Hill 2011, p.408; Hill 2013, p.120). Considering human-environment relations are socially constructed, the dualistic human-nature construction (as is dominant in 'western' society) should not be projected onto people and places where it does not exist (Descola 1996, p.82). Naturalism and animism are the modes of personhood (or modes of relation) present in the religious and/or spiritual thoughts and practices identified in the research area. The population of Ecuador is

predominantly Catholic, but indigenous Andean religious and/or spiritual traditions are also prevalent, including syncretized forms of both (Borsdorf and Stadel 2015, p.302; Cadena 2010, p.334; Corr 2007, p.179; Currie et al 2018, p.470; Eisenstadt and West 2019, p.156-157; Opas 2017, p.86; Whitten 2003, p.378; Zaruma 2006, p.97). Below, the construction of human-environment relations is first discussed within the tradition of Christianity, and secondly within the indigenous Andean tradition that is centered around 'Pachamama'.

5.3.1 Christianity

Human Role: Dominion or Stewardship?

Two predominant narratives can be identified regarding the construction of human-environment relations within Christianity: the 'dominion' narrative (i.e., humankind as the conqueror of the environment) and the 'stewardship' narrative (i.e., humankind as the keeper, guardian or custodian of the environment) (Konisky 2018, p.269; Schuman et al 2018, p.2; Uggla 2010, p.80).

White (1967) contends that Christianity is to blame for the current ecological crisis. Christianity is argued to be "the most anthropocentric religion the world has seen"[12], providing the moral foundation of human dominion over nature and allowing for the uncontrolled exploitation of nature (White 1967, p.1206). According to the Christian tradition, God said: "Let us make man to our image and likeness; and let him have *dominion* over the fishes of the sea and the fowls of the air, and the beasts, and the whole earth, and every creeping creature" (Genesis, I-26, my emphasis). Then, God blessed them and said: "Increase and multiply, and fill the earth and *subdue it* and *rule over* the fishes of the sea and the fowls of the air and all living creatures that move upon the earth" (Genesis, I-28, my emphasis). The terms dominion, subduing, ruling over, mastery and conquering are frequently used in various translations of Genesis I to refer to the relation between humans and the rest of creation. The narrative can be interpreted as revealing a belief in the pre-eminence of human beings over all other species on earth, for only humans are made in the image of God, and are – therefore – placed at the center of creation. All other living beings are deemed to merely exist to serve as an instrument for fulfilling perceived human needs, condoning the endless exploitation of the earth through the exertion of control over the natural environment in order to retrieve all the resources (and sinks) humans desire (see Bourdeau 2004, p.10-11; Chuvieco 2012, p.11-12; Folke et al 2011, p.720; Heyd 2007, p.2; Howell 1996, p.127; Merchant 2003, p.23; Roncancio et al 2019, p.2; Vilaça 2015, p.8; White 1967, p.1205). However, the expansion and dominion of humankind through the unrestrained use of nature eventually denies its own conditions for continuation by destroying the natural resource base, and along with it the conditions that allow for the possibility of humankind to exist (Avelar 2014, p.110-111; Berry 2011, p.4; Gibson-Graham 2011, p.5; Hall 2011, p.375; Kopnina et al 2018, p.115; Merchant 2008, p.18; Mrozowski 2018, p.49; Sponsel 2015, p.22; Tuhiwai Smith 1999, p.47-48). Therefore, Avelar (2014, p.117) argues that Genesis I is predicated on an assumption that natural resources are infinite, resulting in the illusion that the endless exploitation of nature is possible (see Beddoea et al 2009, p.2485; Capra 2012, p.1).

Various scholars have criticized the argument that Christianity is the cause of the current ecological crisis. These scholars argue that the anthropocentric reading of the above-described narrative of Genesis I is imposed upon the text based on post-Cartesian (or Enlightenment or 'western') assumptions of the reader, involving a radical discontinuity between humans (or culture) and nature. Therefore, the anthropocentric reading is not considered to reflect an understanding of the text in its own sociohistorical context. A 'true' reading of Christian narratives is argued to reveal a construction of human-environment relations based on stewardship (see Enqvist et al 2018, p.21; Hitzhusen and Tucker 2013, p.368; Hoffman and Sandelands 2005, p.153-154; Lin 2016, p.52-53). Stewardship

refers to the role that individuals and/or groups adopt based on a set of moral guidelines, virtues or philosophical principles. It involves a sense of responsibility to protect and care for something (e.g., the earth) and an answerability to someone (e.g., God or future generations) (Bennett et al 2018, p.602; Seamer 1998, p.201; Welchman 2012, p.308). According to the Christian tradition, God placed 'man' in the Garden of Eden and instructed him to "dress", "keep", "tend", "guard", or "watch over" it (Genesis, II-15) (Merchant 2003, p.23). This narrative can be read as suggesting that humans were created to be caretakers or stewards of creation, and – as such – are required to treat the rest of creation responsibly in order to ensure its well-being over time (Chuvieco 2012, p.12; Merchant 2003, p.82).

Human Position: Continuity or Discontinuity?

The above discussion mainly revolves around the *role* of humans towards the rest of creation, but the *position* of humans in relation to the rest of creation has also been debated in terms of the degree of continuity and/or discontinuity between the human species and the rest of creation. The position of discontinuity is based on the notion that humans were created in God's image (see Genesis, I-26), and – therefore – are distinctive from and superior to the rest of creation based on certain inherent human faculties (e.g., reason or free will) and the ability to rule or steward over other species (Kim 2018, p.551). An emphasis placed on discontinuity reveals a naturalistic mode of personhood. Naturalism is predicated upon a nature-culture dichotomy based upon a discontinuity of 'interiorities' (e.g., language, mind, or moral conscience) and a material continuity (i.e., other species may be biologically very close to the human species) (Descola 1996, p.88; Descola 2006, p.144). On the other hand, various scholars argue for a continuity between the human and nonhuman for "the separation of humans and nature is unbiblical" (Schuman et al 2018, p.2; Simkins 2014, p.398-399). This view is evident from two quotes from the Christian creation narrative: 1) "God shaped man from the soil of the ground and blew the breath of life into his nostrils, and man became a living being" (Genesis, II, 7-15), and 2) "Humans are part of the soil and will go back to it: as you were taken from it. For dust you are and to dust you shall return" (Genesis, III-19). An emphasis placed on continuity could reflect an animistic mode of personhood, which is further discussed below.

5.3.2 Pachamama/Mother Earth

In indigenous Andean religious and/or spiritual thought and practice, Pachamama or Mother Earth is a central figure. The indigenous concept of 'Pacha' has been loosely translated to mean 'nature' (Knauß 2018, p.703). 'Pacha', however, does not simply refer to nature in space and time, as nature often does not exist as such (i.e., the distinction between humans and nature is not made). Fatheuer (2011, p.21) argues that 'Pacha' refers to "a form of life that overcomes the nature of space and time […] it is the ability to actively take part in the universe, to immerse one's self in it." Similarly, Scoville-Simonds (2018, p.351) argues that 'Pacha' refers to both space and time, and can be translated in various ways to mean earth, world, nature, environment, place, soil, age, era, and time. Taken together, 'Pachamama' refers to "the mother of the world and being" (Fatheuer 2011, p.21). In indigenous Andean traditions, the earth is commonly conceived of as a mother figure, because all life – human and nonhuman – is born from her. She gives food, drink and clothing, and all life returns to her after death. Thus, the earth is conceived of as a subject (i.e., a 'she' and not an 'it') (Zaruma 2006, p.102; 289; Scoville-Simonds 2018, p.353). In indigenous Andean traditions, all living beings in one's surrounding can potentially be conceived of as subjects, who have souls and – therefore – have virtue and power (Zaruma 2006, p.81). These engagements with the nonhuman reveal an animistic mode of personhood (in contrast to a naturalistic mode, as identified above). According to an animistic mode of personhood, nonhuman beings or things (e.g., the earth herself, places, hurricanes, mountains, animals, and plants) are frequently endowed with qualities of agency, subjectivity, and intentionality. Therefore, these nonhuman beings and/or things can be conceived of and treated as persons (or parts

of persons) who are part of the social realm, demonstrating a continuity of relations between the human and nonhuman (Cadena 2010, p.341; Halbmayer 2012b, p.106; Oliver 2009, p.53-54; Paerregaard 2013, p.291-292; Sillar 2009, p.371; Zoomers 2010, p.150). Thus, animism is predicated on a continuity of 'interiorities' (e.g., intentionality or subjectivity), and a material discontinuity (i.e., different beings have different bodies) (Descola 2013, p.116).

The recognition of nonhuman beings as endowed with subjectivity allows for the expansion of moral consideration and relations of reciprocity (i.e., the giving and receiving of services) beyond the human, which – likely – results in the treatment of nonhuman persons as more than mere resources for human use, but as active and responsive co-inhabitants of the earth (see Cruikshank 2001, p.378; Harvey 2016, p.309; Heyd 2007, p.9; Rozzi 2015b, p.133; Sullivan 2016, p.163). In the Andes, this commonly results in values related to the maintenance of complementary, reciprocal relationships ('ayni') with Pachamama (as is seen in section 5.2). When humans respect (i.e., repay or nourish) Pachamama, she can be expected to feed and take care of humans in return through – for example – plentiful harvests (Boelens 2014, p.241; Sillar 2009, p.371-372; Zaruma 2006, p.85-86). Thus, these animistic conceptualizations can result in particular valuations and interpretations of, and responses to, environmental changes (including changes in the climate), which are grounded in a sense of social responsibility and moral obligations of reciprocity towards all the beings one is embedded in a relation with. Consequently, in animistic societies, people are expected to assume individual and/or collective responsibility for the changes occurring in their environment (Crate 2008, p.575; Cruikshank 2001, p.382; 391; Heyd 2008; Mathez-Stiefel et al 2007, p.72; Roncoli et al 2002, p.413; Roncoli et al 2016, p.96-97; Sillar 2009, p.376-377; Ulloa 2017, p.177; Whyte 2014, p.602-603), which can include changes in climate conditions (see Kronik and Verner 2010a, p.4; 23; Roncoli et al 2016, p.97). It should be mentioned, however, that animism is not necessarily connected to an ethical mandate that requires care for the nonhuman. There is a difference between models of how the world is (e.g., animated by sentient persons) and ethical models of how one ought to behave in the world (e.g., animals and plants should be cared for) (see Snodgrass and Tiedje 2008, p.10).

Indigenous Andean spiritual and/or religious beliefs frequently integrate elements from Christianity to form a 'Mother-Father God' complex, in which Pachamama is the feminine side of the Christian God. In this complex, the Christian God and Pachamama are connected inseparably (i.e., 'God acts in and is united with earth' or 'God is manifested in earth') (Opas 2017, p.94; Zaruma 2006, p.81-82; 99). This is contradictory to an emphasis on the transcendence of God above creation in the sense of a 'mechanistically steered' universe (Chuvieco 2012, p.15).

5.4 Assigned Environmental Values

It is important to develop an understanding of the different values that are assigned to various aspects of the environment, as these values determine what are considered to constitute harmful impacts on the environment resulting from – for example – changes in the climate. What is considered to constitute harmful impacts on the environment influences what impacts from changes in the climate call for the need of a response. Assigned environmental values have predominantly been placed in a dichotomy between instrumental values (i.e., the environment is valued in terms of fulfilling human needs), and intrinsic values (i.e., the environment has inherent value independent of human needs) (Pascual et al 2017, p.9). Recently, a third mode of assigned environmental values has been proposed, which has been referred to as relational values (see Chan et al 2016, p.1462; Gould et al 2019, p.1217; Stålhammar and Thorén 2019, p.1202). Relational values refer to: 1) concerns associated with relational responsibilities between humans and the environment, 2) views of personal and collective well-being – or a 'worthy life' – as derived from relations with the environment, and 3) ideas of

justice, reciprocity, care and virtue associated with relations with the environment. These values are not independent of humans (i.e., not intrinsic), and it would be reductionist to propose that the environment merely exists to fulfill human needs (i.e., not instrumental) (Arias-Arévalo et al 2017, p.2; Chan et al 2016, p.1462-1463; Himes and Muraca 2018, p.2-3; Klain et al 2017, p.2; West et al 2018, p.1). It should be noted that all environmental values are relational in origin (i.e., they arise from encounters between humans and the environment). Relational values are specifically concerned with values that are relational in content (i.e., are more than only relational in origin), in which the relationship itself is important, not only as a means to an end (Chan et al 2018, p.A3-A4; Himes and Muraca 2018, p.2). Stewardship (in Christian traditions and Pachamama), as discussed above, is commonly motivated by relational values involving valued reciprocal relations between the human and nonhuman (Chan et al 2016, p.1462-1463; West et al 2018, p.1).

5.5 Buen Vivir

Finally, the principle of Buen Vivir is of interest to discuss because of its prominence in Ecuador, and as it reveals various held values that can be threatened by changes in the climate and/or can guide action in response to climate change. The principle of Buen Vivir has been proposed as an alternative to development based on indigenous Amazonian and Andean philosophies of life. It originates from the concepts of 'Sumak Kawsay' (in Quechua) or 'Suma Qamaña' (in Aymara), which has been translated into Spanish as 'Buen Vivir', 'Vivir Bien' or 'Vida en Plenitud', and can be translated into English as 'Good Living', 'Living Well', or 'Full Life' (Cochrane 2014, p.578; Cubillo-Guevara et al 2014, p.29; Gudynas 2011a, p.1; Macas 2010, p.14). Buen Vivir is a dynamic and plural concept, evoking various interpretations. Therefore, there is no single definition that fits every context (Cubillo-Guevara et al 2016, p.34; Gudynas 2011b, p.441-443; Merino 2016, p.273; Villalba 2013, p.1429). Nevertheless, there are various common ideas that can be brought together to provide a broad definition (Gudynas 2011b, p.445). Buen Vivir can be defined as "the collective achievement of a full life or a life lived in fulfillment, based on harmonic and balanced relations among human beings and all living beings, in reciprocity and complementarity" (León 2012, p.24). Harmonic and balanced relations include: internal harmony within oneself, social harmony within the community and between communities, and harmony with nonhuman living beings. It aims to break with the human-nature dichotomy by acknowledging that human beings are a constituent part of mother earth (see Cubillo-Guevara et al 2014, p.29; Cubillo-Guevara et al 2016, p.36; León 2012, p.24; SENPLADES 2013, p.14).

It should be emphasized that Buen Vivir refers to a *collective* achievement, and – as such – the idea is to live well together, not to live better on an individual level. In this manner, the principle of Buen Vivir aims to break with the centrality and superiority of the human individual by highlighting other forms of relations that focus on collectivity, harmony, and interdependence within and between human and nonhuman beings. On a larger level, the aim is to end the competition on the global capitalist market, which is oriented towards material accumulation, and has turned nature into an object to be dominated and appropriated based on a search for endless economic growth (Cubillo-Guevara et al 2016, p.36-37; Gudynas 2011a, p.13-15; Lalander 2014, p.154; León 2012, p.24; Quick and Spartz 2018, p.764-765; Thomson 2011, p.451; Villalba 2013, p.1431). Buen Vivir – as an alternative to development – is according to various scholars expected to be able to effectively respond to climate change, and to address increasing social marginalization, which the principle of development has not been able to resolve (Acosta 2010, p.11-12; Cochrane 2014, p.578-581; Gudynas 2011a, p.2).

The principle of Buen Vivir has been implemented in the Ecuadorian Constitution as a set of rights related to, for example: nutrition, education, housing, health, water, and a clean environment. In 2008,

Ecuador was the first country to recognize the right of nature (or Pachamama) to be protected and to be treated with respect, as essential to the achievement of Buen Vivir (Ecuador 2008, art. 71). The constitutional recognition of the rights of nature has great potential to stimulate a shift from a conception of nature as an object to be exploited to a conception of nature as a subject to be respected and protected (Escobar 2012, p.66). Nevertheless, the practical implementation of Buen Vivir remains contentious for various reasons. The Ecuadorian Constitution establishes that natural resources belong to the state (art. 317), the state is allowed to exploit natural resources in protected areas (art. 407), and there is no acknowledgement of indigenous peoples' rights to informed consent (see Merino 2016, p.274-275). Consequently, the Ecuadorian government has been able to increase the exploration of oil in the Amazon region in an area that overlaps with the land of ten indigenous groups (Cochrane 2014, p.584; Eisenstadt and West 2017, p.43; Merino 2016, p.275; Rozzi 2015a, p.96).

5.6 Case-Study

Values are complicated and difficult to access solely based on interviews, as values are more often expressed through practice instead of speech. Nevertheless, by means of specific questions, as described in the sections below, it was possible for the participants to express various held and assigned values related to the environment. The manner in which these values can influence undertaken and proposed responses to changes in the climate is discussed in chapter 7.

5.6.1 Construction of Human-Environment Relations

The research participants were asked various questions in order to assess their constructions of human-environment relations. These constructions are expected to guide human moral behavior towards the environment, and – as such – are expected to influence how people respond to threats posed against the environment resulting from changes in the climate. Firstly, the participants were asked to describe their religious and/or spiritual beliefs. All of the research participants self-identified as Catholic. A few of the participants did reveal in the interviews that they, at least partially, also relate to various aspects of indigenous Andean thought and practice. However, it should be noted that in this chapter more attention is paid to Christianity, instead of indigenous Andean traditions, as Christian beliefs are more easily accessible through the literature and the interviews. Similarly, Zaruma (2006, p.97) argues that among the Quechuas (the indigenous peoples of the Andes), Christian elements are more easily recognizable because these elements appear on the outer layer of their beliefs and customs, while the indigenous elements remain more hidden, but still stand strong. Secondly, the research participants were asked to describe the similarities and/or differences between humans, animals and plants. Finally, they were asked whether they consider humans to be part of nature and/or Pachamama, or not.

For all of the research participants it is clear, the environment should be cared for and protected, as one participant states: "We must take care, we must not contaminate" ("*Debemos cuidar, no debemos contaminar*") (Catacocha, Indigenous, M). Another participant shares this sentiment: "We have to respect nature a lot. I think there should be a lot of respect for the mountains, for the garden" ("*Tenemos que respetar mucho a la naturaleza. Creo que debería haber mucho respeto a las montañas, a la huerta*") (Chiquintad, Mestizo, W, 1980). However, the research participants draw upon different motivations for the protection of the environment based upon different constructions of the relations between the human and nonhuman. There are two predominant narratives: 1) humans are different from nonhumans (e.g., plants and animals) based on certain inherent human faculties (e.g., intelligence and language); and 2) humans are the same as nonhumans. It should be noted that in this section the focus is placed on religious and/or spiritual aspects, but intergenerational equity also

appears to be a potential motivation for stewardship among the participants, as is already shown in chapter 4.

Human-Nonhuman Discontinuity

Various research participants construct a distinction between human and nonhuman beings based on certain interior human qualities. One of these interior human qualities is intelligence, as one of the participants argues: "Plants also have life. They also need to be nurtured. Just like us. Just like the animals. They also need to eat. But we are like God, and have intelligence" ("*Las plantitas también tienen vida. Ellas también necesitan nutrirse. Igual que nosotros. Igual los animalitos también. Ellos también necesitan comer. Pero nosotros somos semejantes a Dios y tenemos la inteligencia*") (Guapán, Mestizo, W, 1956). Another participant considers the capacity to think rationally as the main difference between human and nonhuman beings: "I know that we are rational animals. I believe that God created humankind to dominate all kinds of animals, but animals are part of our life" ("*Yo sé que nosotros somos animales racionales. Yo creo que Dios creó el hombre para que domine todo tipo de animales, pero los animales son parte de nuestra vida*") (Guapán, Mestizo, M, 1962).

Another interviewee conceives of the ability to put thought into action as the key distinction: "The human being has an awareness that is very different from the animal. The human thinks and can implement what he thinks in a faster, more effective way" ("*El ser humano tiene una conciencia de que muy diferente al animal. El hombre piensa y puede lo que piensa ponerles en ejecución de una manera más rápida, más eficaz*") (Chiquintad, Mestizo, M, 1960). Finally, one participant refers to communication as the main difference: "The difference is that we can speak. Everything feels. Everything has the same emotions as us, but [animals and plants] cannot speak" ("*La diferencia es que nosotros podemos hablar. De todo sentimos. Todos tienen las mismas emociones que nosotros, pero los [animales y plantas] no pueden hablar*") (Ricaurte, Mestizo, W, 1995)

These differences in interior qualities (e.g., intelligence, rational thinking and communication), however, do not lead any of the participants to suggest that humans are allowed to exploit the environment, but that humans should take on the responsibility to take care of the environment (i.e., be stewards). For example one of the respondents argues: "I think that to us that wisdom of having intelligence is to be able to take care of the animals and depend on them" ("*Pienso que a nosotros esa sabiduría de tener inteligencia es para poder cuidar a los animalitos y depender de ellos*") (Guapán, Mestizo, M, 1962). Another participant reiterates this sentiment: "Plants [and] animals need humankind for their care, for their protection" ("*Las plantas [y] los animales necesita del hombre para su cuidado, para su protección*") (Chiquintad, Mestizo, M, 1960).

Despite constructing a discontinuity between human and nonhuman beings based on species' interiorieties, these participants do consider humans to be part of nature. For example, it is argued that: "[Humans are] part of nature because humans must take care of nature" ("*[Humanos son] parte de la naturaleza porque humanos deben cuidar a la naturaleza*") (Jerusalén, Mestizo, M, 1943). This view is shared by another interviewee who states: "It is that humans have to be part of nature, because if they are not part [of nature], it is very difficult to coexist between nature and humankind" ("*Es que los humanos tienen que ser parte de la naturaleza, porque si no son parte [de la naturaleza] es muy difícil convivir entre la naturaleza y el humano*") (Chiquintad, Mestizo, M, 1960).

Continuity and discontinuity seem to exist simultaneously: humans are considered to be part of nature, but are also seen as a species that is distinct from other species. This construction of the human-environment relation does not seem to fully fit with the naturalistic mode of personhood, in which

there is a belief in the existence of a human-nature dichotomy. Todd (2015, p.250) uses the term 'ethical relationality' to refer to the recognition of difference between the human and nonhuman, while – concurrently – emphasizing that we are in the world together and need to think and act with reference to the relations that we are a part of. The research participants do acknowledge that nonhuman beings are alive (as is seen in the quotes above), and – therefore – need to be nurtured, need water, and need food. Similarly, Bolin (1998, p.43) argues that it is commonly recognized in the Andes that all beings live, feel and breathe, and – therefore – need food, drink, love and consideration. Superiority of the human species in this context does not result in human dominion over nonhuman beings, but requires humans to care for the environment (i.e., to act as stewards).

Human and Nonhuman Continuity

Various research participants do not identify any difference between human beings and nonhuman beings, as one of the respondents notes: "I believe that everything is the same. Plants, when there is no rain, they will wilt. Just like cattle. If there is no water, there would be no survival. It is the same for us" ("*Yo creo que todo es igual. Las plantas, cuando no hay lluvia, se marchitan. Igual el ganado. Si es que no hay agua, no hay sobreviviría. Igual somos nosotros también*") (Jerusalén, Indigenous, W, 1977). This view is similarly expressed by another participant: "We are all on the same planet. Animals also suffer from food shortages, and you and me with contaminated food" ("*Todos estamos en el mismo planeta. Los animales también sufren de escasez del alimento, y usted y mi con alimentos contaminados*") (Ricaurte, Mestizo, M, 1952). Another participant does recognize a difference between domesticated species and undomesticated species, in which humans are part of the domesticated group: "Here there is no difference. We are the same here in the 'campo'. Here there is no wild animal. Everything is domestic. We are domestic, the animals are the same and the trees are the same" ("*Aquí no hay diferencia. Nosotros somos igual aquí en el campo. Por aquí no existe un animal salvaje. Todo es doméstico. Que lo doméstico es nosotros, igual los animalitos también y los árboles igual*") (Honorato Vásquez, Mestizo, M, 1982).

Two participants refer to 'Pachamama' or 'Madre Tierra' in the interviews. One of the two participants continuously shifts during the interview between the terms 'nature' and 'mother earth', but is consistent in referring to nature/mother earth as a subject: "Nature is very important to me because she is the one that sustains us, gives us warmth, gives us cold, gives us water and everything" ("*La naturaleza es muy importante para mí porque ella es la que nos sostiene, nos da calor, nos da frío, nos da agua y todo*") (Chiquintad, Mestizo, W, 1980). The other participant does more consistently use the term 'Pachamama' or 'Madre Tierra', instead of 'nature', as he states: "It is an indigenous cosmovision of our Pachamama, Mother Earth. If I do not respect Mother Earth, I do not respect myself. So Mama Pacha, Pachamama is because I was born from her. We have a vision that for them we live as indigenous peoples. Pachamama is Mother Earth, and Taita Inti is Father Sun and Mama Killa is Mother Moon" ("*Es una cosmovisión indígena de nuestro Pachamama, Madre Tierra. Si yo no respeto a la madre tierra, yo no respeto a mí mismo. Entonces la Mama Pacha, la Pachamama es porque yo nací de ella. Nosotros tenemos una visión que por ellos vivimos como indígenas. Pachamama es Madre Tierra, y Taita Inti es Padre Sol y la Mama Killa es Madre Luna*") (El Tambo, Indigenous, M, 1955). According to Zaruma (2006, p.106; 399), the Cañari (the indigenous people from the province of Cañar) view Mama Killa and Taita Inti as parts of the celestial realm who give energy to Pachamama, and – therefore – humans should be thankful to these beings for contributing to the production of good agricultural harvests. 'Madre Tierra' is by both participants seen as a nurturing subject, revealing elements of an animistic mode of personhood.

The participants who mention 'Madre Tierra' have slightly different constructions of the human-environment relation. One of the participants argues that there is no distinction between the human and nonhuman species: "There is no difference to me. The plant needs a good deal of care, just like ourselves. We have to take care of the plants. I say that we are created by the same nature" ("*No hay diferencia para mí. La plantita necesita cuidar bastante, como nosotros mismos. Tenemos que cuidar las plantitas. Yo digo que somos creados por la misma naturaleza*") (Chiquintad, Mestizo, W, 1980). This view leads the participant to suggest that humans should take on a caring role: "I imagine God sent us to take care of our nature and our Mother Earth" ("*Me imagino Dios nos mandó para que cuidemos de nuestra naturaleza y nuestra Madre Tierra*") (Chiquintad, Mestizo, W, 1980). The other participant seems to reverse the idea that humans are superior to nonhuman beings based on particular interior qualities: "Practically with animals there is no way to communicate, but we realize that they are more rational. If I am not going to move the animal, they cry. So you have to be responsible, active and punctual in your work" ("*Prácticamente con los animales no hay cómo comunicarnos, pero damos cuenta que ellos son más racionales. Si yo no voy a mudar el animalito, ellos lloran. Entonces uno tiene que ser responsable, activo y puntual en su trabajo*") (El Tambo, Indigenous, M, 1955). This participant, furthermore, conceives of humans as inescapably part of the earth: "[From] dust you were born and [to] dust you will return. Logically that is what we are. Earth I am and earth I will return" ("*Polvo naciste y polvo volverás. Lógicamente eso somos. Tierra soy y tierra volverá*") (El Tambo, Indigenous, M, 1955).

5.6.2 Assigned Environmental Values

During the interviews, when talking about what is important about the environment, the participants predominantly emphasize the importance of water, and – as such – this section focuses on what values the participants assign to water (i.e., what is important about water). To the participants it seems to be self-evident that water is essential to life: "Without water, we cannot live. It is the most important thing for us" ("*Sin agua no podemos vivir. Es lo más importante para nosotros*") (Jerusalén, Mestizo, M, 1943). Another participant shares this sentiment: "Water is the basis of everything, because without water you cannot live" ("*El agua es la base de todo, porque sin agua no se puede vivir*") (Jerusalén, Indigenous, W, 1977).

Interestingly, one of the participants draws a connection between water and blood: "Water for us – as an indigenous movement, as Christians, as farmers – is blood that runs in our veins, that is water. If there is no water, we do not live" ("*Agua para nosotros – como movimiento indígena, como cristianos, como agricultores – es una sangre que corre en nuestras venas, ese es agua. Si no hay agua, no vivimos*") (El Tambo, Indigenous, M, 1955). The connection between water and blood has previously been identified in the Andes, where the water flowing through the underground rivers is frequently conceived of as the bloodstream of Pachamama and the Apus (the mountain deity). This metaphor is interpreted to reveal a consideration of water as a vital liquid (Sherbondy 1998, p.212-214; Zaruma 2006, p.363). Such an awareness of water as a vital liquid is likely the result of the participants' dependence upon water for their livelihoods, and the uncertainty and risk associated with access to water in the Andes.

It cannot be stated with certainty whether these assigned values to water reflect instrumental, intrinsic or relational values. An emphasis on water as an essential liquid for the continuation of human lives could entail the attribution of instrumental values, but many participants consider water to be essential for the continuation of the lives of all beings, not only humans. The connection made between water and blood could entail the attribution of relational values, as it reveals an intimate relation between the earth and human beings.

5.6.3 Buen Vivir

There are two main aspects through which the participants define Buen Vivir: 1) through an emphasis on collectivity and good relations (e.g., within the family and community, but also with nature or mother earth), and 2) through an emphasis on healthy nutrition. Both of these aspects are affected by the perceived changes in the climate.

Collectivity

The element of collectivity and the maintenance of good relations is used by almost all of the participants to define Buen Vivir. For example, one of the respondents defines Buen Vivir as follows: "It would be the harmony that we have ourselves with other people, trying to have an environment of fellowship with the people around us and with nature as well" ("*Sería la armonía que tenemos nosotros mismos con el demás de las personas, intentando tener un ambiente de confraternidad con las personas que nos rodean y con la naturaleza también*") (Ricaurte, Mestizo, W, 1995). Another respondent considers Buen Vivir to reflect an imperative to help each other: "The most important thing would be that we have to help each other. We have to take care of each other. There are many people who do not have, for example, tap water, due to scarce economic resources. So we sometimes help, we say: you do not have it, come take it from here. So with that we are also collaborating with Buen Vivir" ("*Lo más importante sería que tenemos que ayudarnos mutuamente. Tenemos que cuidarnos mutuamente. Hay muchas personas que no tienen, por ejemplo, el agua entubada por los escasos recursos económicos. Entonces nosotros a veces ayudamos, decimos: ustedes no tienen, venga a llevar de acá. Entonces de eso también estamos colaborando con buen vivir*") (Guapán, Mestizo, W, 1956).

Another interviewee connects the principle of Buen Vivir with principles from the Bible: "Living in harmony, loving each other as the Bible says. That is Buen Vivir for me. We live in an environment with our neighbor" ("*El buen vivir, vivir en armonía, queriendo los unos o los otros como la biblia dice. Eso es para mí el buen vivir. Vivimos en un ambiente con el prójimo*") (Ricaurte, Mestizo, M, 1952). Finally, another participant emphasizes that the principle of Buen Vivir should not discriminate people based on their ethnicity: "Buen Vivir is a matter that we must have with a change of understanding or a change in the worldview of civil society because among white people, among mestizos, among black people and among indigenous peoples, Buen Vivir must be a comprehensive society" ("*El buen vivir es un asunto que tenemos que tener nosotros con cambio de entendimiento o cambio de la cosmovisión de la sociedad civil porque entre blancos entre mestizos entre negros y entre indígenas, el buen vivir tiene que ser una sociedad integral*") (El Tambo, Indigenous, M, 1955).

The ability to maintain good relations within the community is by the participants considered to be affected by the perceived changes in the climate, as reduced access to water has resulted in more conflict about water. For example, one of the participants notes: "Water is all we need and many people fight for water because it is becoming more scarce. There are conflicts over water, but I think that we should share the water" ("*El agua es todo los necesitamos y mucha gente pelea por el agua porque cada vez se va haciendo más escasa. Hay conflictos por el tema del agua, pero creo que deberíamos compartir el agua*") (Catacocha, Indigenous, M). Another respondent shares a similar observation: "Here, I think that the war for water is coming and that is going to be because everyone wants water and there is no water" ("*Aquí creo que viene la guerra del agua y eso va a ser porque todo el mundo queremos agua y no hay agua*") (Honorato Vásquez, Mestizo, M, 1969). This sentiment is reiterated by another interviewee: "Right now we fight over water" ("*Ahorita nos peleamos por el agua, ahí nos peleamos por el agua*") (Ricaurte, Mestizo, W, 1995).

Healthy Nutrition

When defining Buen Vivir, various participants place importance on consuming food that they produce themselves – without the use of chemicals – for the maintenance of their health. For example, one of the respondents notes: "For me Buen Vivir would be to nourish ourselves with what we make, for our health, because we sow our products without chemicals, only water. We do not buy anything that is vegetables, nothing of that, we only buy rice and salt, nothing else, because we have everything in my garden. If we eat outside we do not know how it is cultivated. So for me, Buen Vivir would be good nutrition" ("*Para mí Buen Vivir sería alimentarnos de lo que nosotros hacemos, por la salud de nosotros, porque estamos sembrando nuestros productos acero químicos, solamente con agua. Nosotros no compramos nada de lo que es verduras, nada de eso, solamente lo compramos es el arroz y la sal, nada más, porque nosotros en mi huerto tengo de todo. Si nos alimentamos afuera no sabemos cómo será cultivada. Entonces para mí Buen Vivir sería la buena alimentación*") (Chiquintad, Mestizo, W, 1980).

This sentiment is similarly expressed by another interviewee: "I nourish myself with my own fruits, because I know that I take care of them, that [they are] healthy. So I enjoy them" ("*Yo me nutro de mis propios frutos, porque yo sé que yo les de cuidado, que [están] sanos. Entonces disfruto de ellos*") (Guapán, Mestizo, W, 1956). Likewise another participant notes: "I try to take care of my family, not consuming chemicals. I am the enemy of all these things, but unfortunately sometimes you have do that. But I am always attached to the natural, convinced of eating healthy, natural" ("*Yo trato de cuidar a mi familia, no consumiendo químicos. Soy enemigo de todas esas cosas, pero lamentablemente a veces hay que acudir a eso. Pero yo siempre soy apegado a lo natural, convencida de que alimentarme sano, natural*") (Ricaurte, Mestizo, M, 1952).

The ability to consume healthy foods is affected by the perceived changes in the climate, as increasing temperatures have led to an increase in pests, and the need to use chemicals (as is already discussed in chapter 4). One of the interviewees notes: "It seems that it used to be healthier. There used to not be such contamination as now. The plantations, everything was healthier. Now it is not like before, now it is just food that hurts people" ("*Parece que era más sana. No había ese contaminación que ahora. Las plantaciones, todo era más sana. Ahora no es como antes, que ahora es comidas solo que le hacen daño a las personas*") (Jerusalén, Indigenous, W, 1977). This sentiment is shared by another participant: "Sometimes they force us to buy something chemical to combat the insects. But I do not use this spraying in any way for my plants, no way. But for some people yes, because I have seen some people who have" ("*A veces nos obligan a comprar algo química para combatir con los insectos. Pero yo no lo utilizo este fumigación de ninguna manera para mis plantas, ninguna manera. Pero para algunas personas sí, porque yo he visto algunos personas que tienen*") (Chiquintad, Mestizo, W, 1980).

Another respondent reiterates this view: "There used to not be so many pests. You cultivated without chemicals. Right now everything depends on chemicals. Unfortunately 80/90 percent is contaminated with chemicals" ("*No había tantas plagas. Se cultivaba cero químicos. Ahorita todo depende de químicos. Lamentablemente el 80/90 por ciento está contaminado de químicos*") (Ricaurte, Mestizo, M, 1952). Various scholars have already noted the increased use of highly hazardous pesticides by smallholder farmers in the Andean highlands, including Ecuador, due to an increase in insect plagues. This is considered to threaten the food security and food sovereignty of the farmers in the region (Cole et al 2011, p.1; Dangles et al 2010, p.326).

5.7 Conclusion

The aim of this chapter was to identify the held values that shape human moral behavior towards the environment. Various values were identified based on particular constructions of human-environment relations that shape human moral behavior towards the environment. The participants consider humans to be part of nature and/or Mother Earth. All living beings are acknowledged to need nurturing, food and water. Nevertheless, some argue for a discontinuity between human and nonhuman beings based on certain interior faculties (e.g., language and intelligence), which places humans in a superior position over nonhuman beings. This, however, does not entail that humans are allowed to endlessly exploit the environment in order to fulfill human needs, but entails a mandate to care for the nonhuman (or to be stewards of the earth), which likely involves the need to take social responsibility for changes occurring in the environment (including changes in the climate). Second, the aim of this chapter was to identify the assigned environmental values. Water is considered to be one of the most important aspects of the environment and is valued as a vital liquid. For this reason, the participants argue that humans should take on the responsibility to protect and care for water sources. An emphasis placed on taking care for the nonhuman (i.e., to act as stewards) and to take responsibility for changes occurring in the environment largely corresponds to the findings of previous research conducted in the Andean highlands.

Third, the aim of this chapter was to identify the held values that are impacted by the perceived changes in the climate. There are two held values embedded in the principle of Buen Vivir that are affected by the perceived changes in the climate: 1) collectivity and the maintenance of good relations (e.g., within the family and community, but also with nature or mother earth), and 2) healthy nutrition. Reduced access to water – as a consequence of changes in the climate – has resulted in more conflicts about water, compromising the ability of the interviewees to maintain good relations with the members of their respective community. Additionally, the ability to consume healthy, uncontaminated foods has been affected by higher temperatures due to an increase in incidences of insect plagues, resulting in the need to use chemicals in agricultural production. Previous research has focused primarily on values related to the construction of human-environment relations as determined by religious and/or spiritual affiliations. Little attention has been paid to other aspects of values related to particular ways of living, such as collectivity and healthy nutrition. These values can play an important role in developing contextually appropriate climate change response policies that are locally acceptable. For example, an increase in the use of agrochemicals to respond to the proliferation of insect plagues might go against the values of Andean campesinos, while the stimulation of collective action to respond to changes in the climate can be expected to be more widely accepted as it corresponds with the value of collectivity.

Chapter 6: Knowledge

6.1 Introduction

The third axiom, knowledge, is concerned with the ways of monitoring, documenting, communicating, and learning about relations among human and nonhuman beings in the environment, which constitutes a framework through which the perceived changes in the climate are understood (Whyte 2017, p.157). Knowledge is an important axiom to investigate in order to study people's responses to changes in climate conditions, as the manner in which changes in the climate are understood is expected to significantly influence the decisions made to respond to these changes (López et al 2017, p.31; Norton-Smith et al 2016, p.79; Vedwan and Rhoades 2001, p.117; Wolf et al 2013, p.549). The research participants can, furthermore, be expected to maintain important knowledge regarding various changes occurring in their environment – and how these changes are connected – as they are experts in their immediate environment due to the long-term observation of the environment and a dependence on the environment for their livelihoods (see Ashan and Brandt 2015, p.1651; Crate 2015, p.156).

Knowledge of the climate and its changes (as held by the research participants) is far more complex and extensive than is possible to discuss in this chapter due to space and time limitations. For this chapter, the choice is made to focus on how perceived changes in the climate are understood in terms of its causes, as people's knowledge of the causes of the observed changes is expected to be directly related to what are considered to be effective and appropriate strategies for responding to these changes. For example, if deforestation is understood to be a cause of changes in the climate, people can be expected to consider reforestation a potentially effective response. However, if changes in climate conditions are understood as part of God's plan, people can be expected to be against the implementation of strategies to stop the changes in the climate. The aim of this chapter, thus, is to develop an understanding of how the research participants understand the perceived changes in the climate in terms of its causes. First, the results of previous studies are described. Second, the conceptualization of (local) knowledge, and the distinction between observational and receptive (or descriptive) knowledge of changes in the climate is discussed. Finally, the findings from previous studies and various theoretical questions are investigated in relation to the case-study.

6.2 Previous Studies

A large number of studies currently exist on 'local knowledge' of the climate and its changes (see e.g., Boillat and Berkes 2013; Goodall 2008; Green et al 2010; López et al 2017; Weatherhead et al 2010). However, various scholars (see e.g., Berkes 2009, p.154; Cramer et al 2014, p.1001; Cruikshank 2001, p.389; Goldman et al 2018, p.6; Klenk et al 2017, p.9; Scoville-Simonds 2018, p.345-346) argue that many of these studies approach 'local knowledge' as a resource for filling in gaps in techno-scientific knowledge, rather than as a valuable source of knowledge in its own right (see e.g., Alexander et al 2011; Fernández-Llamazares et al 2017; Gearheard et al 2010; Huntington 2000). These studies largely do not recognize the presence of an epistemological hegemony that construes many forms of knowledge as subordinate, nor the consequences of knowledge integration, which can include the subjugation and abstraction of 'local knowledge' to 'fit' techno-scientific constructs of – and approaches to – climate change. In this process of integration, only 'verified' knowledge (according to outsider's validity standards) is taken, while ethical, spiritual and/or religious dimensions are ignored, as these dimensions cannot be easily integrated into existing structures of techno-scientific knowledge (Agrawal 2002, p.290-291; Belfer et al 2017, p.57; Cruikshank 2005, p.250; Davis 2006, p.155; Goldman et al 2018, p.6; Maass 2008, p.102; Nazarea et al 2006, p.75; O'Lear 2016, p.7; Reo 2011, p.1-2; Roncoli et al 2016, p.96-97). These dimensions are, however, fundamental to many people who depend on it, and can significantly influence how changes in the climate are experienced and

responded to (Ford 2012, p.1263; Latulippe 2015, p.3; Leonard et al 2013, p.624; Nadasdy 1999, p.4; Reo 2011, p.2; Rhoades et al 2006, p.74; Roncoli et al 2016, p.87; 96-97; Ulloa 2011, p.33-34; Vedwan and Rhoades 2001, p.117).

Previous studies conducted in the Andes on the understood causes of changes in the climate do frequently consider these links with spiritual and/or religious dimensions. It concerns four studies in Peru (Allison 2015; Jurt et al 2015; Paerregaard 2013; Scoville-Simonds 2018), one study in Bolivia (Boillat and Berkes 2013), and two studies in Ecuador (Jones 2019; Rhoades 2007; Rhoades et al 2008). One recurrent causal explanation for changes in climate conditions in these studies revolves around human failure to maintain proper (reciprocal) relations with the nonhuman or extra-human beings (e.g., Pachamama or God), resulting in punishment (see Allison 2015, p.497; Boillat and Berkes 2013, p.6-7; Jones 2019, p.133; Jurt et al 2015, p.519; Paerregaard 2013, p.296; Rhoades 2007, p.44; Rhoades et al 2008, p.219-221; Scoville-Simonds 2018, p.345; 356). Deforestation, pollution by factories and cities, and contamination through agrochemicals and waste is – along with inadequate ceremonial offerings – seen as a sign of lack of respect for Pachamama and/or the environment, which results in changes in the climate (see Jones 2019, p.131-132; Jurt et al 2015, p.518-519; Paerregaard 2013, p.300; Rhoades 2007, p.44). The causes of changes in climate conditions is in these contexts predominantly framed in terms of local human moral and/or spiritual behavior and responsibility, as participants do not seek causes for the perceived changes in other parts of the world and argue that local solutions are required. Thus, the participants in these studies do not appear to subscribe to the construction of climate change as a global phenomenon, but do acknowledge the causes to be anthropogenic (see Boillat and Berkes 2013, p.9; Jones 2019, p.131-132; Jurt et al 2015, p.519; Paerregaard 2013, p.290-291). However, another causal explanation – predominant among various participants in the selected studies – considers the changes in the climate to be a sign foretelling the end of the world (or final judgment) as part of God's plan and/or the Andean conception of 'pachakuti'. Pachakuti is based on a conception of the cosmos as cyclic, in which a new epoch will eventually replace the current time, world or order (see Allison 2015, p.497; Boillat and Berkes 2013, p.1; 6; 9; Scoville-Simonds 2018, p.345; 351; 356).

6.3 Conceptualizing (Local) Knowledge

6.3.1 How 'Local' is 'Local Knowledge'?

In my research, the term 'local knowledge' is avoided when referring to the knowledge of the research participants for various reasons. The knowledge of any group of people who are not considered to be 'scientists' (e.g., various indigenous groups) – according to external standards of what constitutes 'science' – is commonly in its definition and conceptualization confined to the local or traditional (i.e., is considered to be place-specific), whereas 'scientific' knowledge is largely defined and conceptualized as global or universal. Imagining non-'western' peoples as more 'local' than others reveals an assumption of intellectual and spatial confinement that constitutes a colonial legacy (Appadurai, 1988, p.37-38; Maass 2008, p.89-90). All knowledge can be described as a form of local knowledge, as it is produced in a particular time and place (Cameron 2012, p.105-106; Dei et al 2000, p.4; Maass 2008, p.90; Powell 2007, p.311-314; Turnbull 2003, p.19). The critical difference between so-called 'local knowledge' and 'scientific knowledge' is not the degree of localness, but the degree of power (referring to an epistemic hegemony) and the differential assumed capacity of decontextualization and abstraction, in which 'scientific knowledge' is considered to be universal. Both of these elements allow for 'scientific knowledge' to travel more across various contexts (Allison 2015, p.494; Collier 2006, p.400; Maass 2008, p.103; O'Lear 2016, p.7).

Nevertheless, knowledge should not be seen as exclusively local for various reasons. First, knowledge is dynamic and plural. It is continuously revised through adaptation to changing circumstances, and is able to incorporate elements of other knowledges through complex negotiations (e.g., so-called 'local knowledge' can incorporate 'scientific knowledge') (Berkes 2009, p.153; Maass 2008, p.90-91; Orlove et al 2009, p.244). Therefore, various scholars have argued for a consideration of knowledge as process (i.e., a way of making sense of the world), rather than content (i.e., a static archive of data) (Berkes 2009, p.151-153; Boillat and Berkes 2013, p.1; Davidson-Hunt 2003, p.27-28; Goodall 2008, p.355). Second, an emphasis on the 'localness' or 'traditionality' of particular forms of knowledge can result in the disregard of the possibility that people outside of transnational academic institutions might maintain distinct perspectives on contemporary industrial activities or issues (e.g., logging, mining or biodiversity conservation). It should be acknowledged that these perspectives are relevant supra-locally (Boelens et al 2010, p.8; Cameron 2012, p.105; Nadasdy 1999, p.4). For these reasons, in the context of my research, the term campesino knowledge is preferred, referring to the knowledge that campesinos hold, which can include knowledge obtained from the observation of the immediate environment and the incorporation of knowledge produced by transnational scientific institutions.

6.3.2 Observation and Reception

There are two predominant sources through which knowledge on changes in the climate can be retrieved: observation (i.e., firsthand perception of changes in the environment) and reception (i.e., the uptake of information regarding global anthropogenic climate change as distributed by journalists, teachers and/or government officials) (Fernández-Llamazares et al 2015, p.317; Rudiak-Gould 2014, p.75). Rudiak-Gould (2014, p.74) argues that there is a dearth of studies looking at the interplay between observation and reception, and criticizes studies that treat reports of changes in the climate as solely the product of the direct observation of the environment in cases where reception does exist (see also Rudiak-Gould 2011, p.9; Wit et al 2018, p.7-8). The discourse of global anthropogenic climate change is spreading rapidly across the world, and is likely being incorporated into existing forms of knowledge and significantly influencing how perceived changes in the climate are understood (Rudiak-Gould 2011, p.10-11; Rudiak-Gould 2014, p.75; Weber and Schmidt 2016, p.355; Wit et al 2018, p.8). In contrast, various scholars argue that the influence of reception is usually superficial due to significant epistemological differences, and the frequent framing of climate change as a global phenomenon disconnected from people's immediate realities, resulting in the disseminated information being considered irrelevant (Fernández-Llamazares et al 2015, p.316-317; Fleming and Vanclay 2010, p.16; Marin and Berkes 2012, p.1-4).

6.4 Case-Study

In the interviews, the participants were asked why they think that the perceived changes in the climate are happening. Three main categories are identified that cover the explanations that the research participants provide regarding the causes of the observed changes in the climate: landcover change, contamination, and God. Each of these explanations are discussed below. In the discussion, various accounts of the causes of changes in the climate are mentioned; not only the accounts of the research participants. This is not done in order to assess the 'validity' of the statements made by the research participants, but to assist in the assessment of the influence of reception as a source of knowledge.

6.4.1 Changes in Landcover

In the Andes, the primary environmental drivers of changes in water quality and quantity include changes in landcover (Murtinho et al 2013, p.668). The research participants likewise consider

landcover changes (e.g., deforestation, degradation of the *pajonales*, and an increase in number of exotic species) as one of the main causes of observed changes in climate conditions.

The research participants argue that deforestation significantly influences the quantity and quality of water/rainfall, as one of the participants notes: "Every time we cut more and more trees we are left without vegetation. That affects us a lot because the water becomes depleted" ("*Cada vez que tala más y más árboles nos quedamos sin vegetación. Eso nos afecta mucho porque eso se agote el agua*") (Catacocha, Indigenous, M). This argument is based upon a conception of forests as bringers/attractors of rain: "I think because of cutting down forests. Then it does not attract rain. That is why we are like this, suffering from these climates" ("*Creo por el talado de los bosques. Entonces no atrae la lluvia. Por eso estamos nosotros así, padeciendo de estos climas*") (Guapán, Mestizo, W, 1956). This view is shared by another respondent: "The forests will bring the rain. And here, as you saw, there is nothing. Everything has been cut down. Then there is no water" ("*Los bosques llevaran la lluvia. Y aquí, como ustedes veía, no hay nada. Todo lo han talado. Entonces ya no hay agua*") (Honorato Vásquez, Mestizo, M, 1969). One of the participants considers deforestation to be a sign of a lack of respect for the forests: "[…] such as deforestation in the highlands. We no longer respect [the forests]" ("*[…] como por ejemplo la deforestación en los partes altas. Ya no respetamos [los bosques]*") (Honorato Vásquez, Mestizo, M, 1982).

Various participants specify that the increased rate of deforestation and the degradation of the *pajonales* (high altitude wet grasslands and shrublands) is the result of an increase in land used for pasture. For example, one of the participants notes: "Because of the burning of the mountains. They have been expanding for livestock. There is no longer the sponge, which we say, that absorbs the water from the mountain" ("*Por la quema de los montes. Han ido expandiendo por la ganadería. Ya no hay la esponja, que decimos nosotros, que absorbe el agua del monte*") (Guapán, Mestizo, M, 1962). One of the participants notes that livestock has expanded because there is not enough water for agriculture: "The water was drying up and there are no more sources of water for agriculture, for potatoes, for everything you need a lot of water and there is no water. So that is why there is the change right now: there are only pastures. Before there used to be little livestock" ("*El agua se fue secando y ya no hay fuentes de agua para la agricultura, para papas, para todos se necesita mucha agua y no hay agua. Entonces por eso que hay el cambio de ahorita: son solos pastos nomas. Más antes era poco la ganadería*") (Honorato Vásquez, Mestizo, M, 1969).

The expansion of pasture land is argued to lead to erosion: "It is due to a lot of erosion […] More or less until the year 90, there was no destruction of the hydrography in the upper area, but now, because of the agricultural reform in 1983, all the people have gone to bear down the grasslands, the hydrological cushions of biodiversity. There is no grassland above, it is only pasture […] because we want to have cows" ("*Es que por mucho erosión […] Más o menos hasta el año 90, no había las destrucciones hidrografía de las partes de la zona alta, pero como ahora, por la reforma agraria en el año 1983, toda la gente se ha ido a derrotar los pajonales, los colchones hídricos de la biodiversidad. Arriba ya no hay paja, es puro potrero […] porque queremos tener vaquitas*") (El Tambo, Indigenous, M, 1955).

The annual deforestation rate of Ecuador (1.5% for 1990-2000 and 1.8% for 2001-2010) is the highest in South America (FAO 2007, p.38; FAO 2011, p.118). Changes in land use from forest to pasture – in particular on mountain slopes – contributes to an increase in soil loss through erosion, resulting in a decreased ability of the soil to absorb rainwater and a long-term decrease in dry season stream flows (Bruijnzeel 2004, p.217; Murtinho et al 2013, p.669). Moreover, an increase in the rate of deforestation results in an increase in the emission of greenhouse gasses into the atmosphere (as

forests store carbon), which contributes to climate change (IPCC 2014, p.4; 67; 98). Similarly, land-use changes involving the transformation of *pajonales* into pastureland are expected to reduce carbon storage, and the capacity of the soil to store and infiltrate water resulting in a decrease in water regulation and supply (Buytaert et al 2006, p.53-54; Dahik et al 2018, p.1; Valladaresa and Boelens 2019, p.70). The research participants acknowledge the impact of land cover changes on water supply, but do not mention the possibility of deforestation to contribute to the observed changes in the climate through greenhouse gas emissions.

The introduction of exotic species is considered to worsen the situation, as one of the participants notes: "Right now I continue to plant native plants, not exotic, because the exotic plants erode the soil. For example the pine, the eucalyptus ends biodiversity" ("*Ahorita sigo sembrando la plantas nativas, no exóticas, porque las exóticas erosionan el terreno. Por ejemplo el pino, el eucalipto acaba la biodiversidad*") (El Tambo, Indigenous, M, 1955). Another interviewee similarly notes: "What would be very important is a proper planting of native trees, because the cypress, the eucalyptus, the pine, that is sown over there. There you see how it rains and at the foot of the tree it is totally dry. Why? Because they suck much more water than any other plant" ("*Lo que sería muy importante, una siembra propiamente de árboles nativos porque el ciprés, el eucalipto, el pino, eso se siembra por ahí. Ahí usted vaya a ver así llueva y al pie del árbol está totalmente seco. Por qué. Porque ellos chupan mucho más el agua que cualquier otra planta*") (El Tambo, Mestizo, M, 1954).

One of the engineers from the local government of Cañar likewise mentioned that the eucalyptus consumes too much water and should be removed when he accompanied me to Guapán. The predominance of the exotic species of *Eucalyptus* spp. and *Pinus* spp. in forest plantations established in Ecuador is suggested to be the result of a lack of knowledge on the requirements of native species (Günter et al 2009, p.81). Many environmentalists, social activists and people living near plantations have argued for many years that these exotic species consume more water than native trees, but these claims are largely disputed by foresters and policy makers, and the scientific studies remain inconclusive (Carse 2006, p.110).

6.4.2 Contamination

Various participants consider contamination to be the main cause of the perceived changes in the climate. The participants predominantly use the term contamination to refer to the waste and toxic residues found in rivers, as one of the respondents notes: "The river used to be very clean. Before there were no plastics, there was not as much contamination as there is now. Now they are contaminated, the rivers are poisoned. Large cities continue to contaminate with so much plastic, with so much toxic waste from factories. Everything is due to contamination. Because of that there are the climatic changes" ("*El río era muy limpio. Antes no había plásticos, no había tanta contaminación ahora como hay. Ahora ya están contaminados, están envenenadas los ríos. Las ciudades grandes sigue contaminando con tanto plástico, con tantos residuos tóxicos de las fábricas. Todo es por la contaminación. Por eso hay los cambios climáticos*") (Guapán, Mestizo, M, 1962).

Another participant shares this view: "All human beings throw away [trash in the] rivers, that is why we have changes in the climate" ("*Todos los seres humanos, botan [basura en] los ríos, por eso tenemos los cambios en el clima*") (Jerusalén, Mestizo, M, 1943). One of the participants notes that he has tried to change this habit, but with little success: "Here we have barbaric contamination. We have tried to make people aware so that there is not so much contamination, because water is life, but nobody, nobody does anything" ("*Aquí tenemos ustedes la contaminación bárbara. Hemos tratado de concientizar a la gente para que no haya tanta contaminación, porque el agua es vida, pero nadie,*

nadie hace nada") (Ricaurte, Mestizo, M, 1952). The local government official who accompanied me to Guapán also noted the large amount of waste found in the rivers, which is reportedly thrown out by car drivers passing by. Moreover, a few participants mention contamination from mining activities as a cause of the perceived changes in the climate, as one participant mentions: "Here you have to take care of the water sources because they are being contaminated by mining" ("*Aquí hay que cuidar a las fuentes de agua porque están siendo contaminadas por la minería*") (Ricaurte, Mestizo, W, 1995).

6.4.3 Reception or Observation?

The above-mentioned causes mainly involve human activities taking place nearby. Thus, most of the participants acknowledge that the changes in climate conditions are anthropogenic, as one of the participants states: "We are to blame" ("*Nosotros tenemos la culpa*") (Guapán, Mestizo, M, 1962). The recognition that human activities are causing the observed changes in the climate could suggest that reception is significantly influencing the knowledge that the participants have regarding the causes of the changes in the climate. However, the emphasis placed on anthropogenic causes could also be the result of the importance placed in the Andes on taking social responsibility for the changes in the environment (as is shown in chapter 5). Moreover, only one of the participants explicitly mentions greenhouse gas emissions as a cause of changes in the climate: "The industries that release their gases, their fumes. I think that we have this car, it discharges the same of what burns. It seems that global warming is happening because of that" ("*Las industrias que sale sus gases, sus humos. Pienso que tenemos este carro, el mismo desfogue de lo que se quema. Parece que el calentamiento global viene por eso*") (El Tambo, Mestizo, M, 1954). The limited reference to greenhouse gas emissions could be the result of it being less visible than – for example – waste in the rivers, and could suggest that the uptake of information from the media is limited.

Furthermore, the participants predominantly look for causes in their community, or in nearby cities, but not globally. Although, one participant does mention industrialized countries in general: "Due to contamination in general worldwide. You are European? There are other industrialized countries that are major contaminators" ("*Por la contaminación en general a nivel mundial. Usted es Europea? Hay otros países industrializados que son mayores contaminadores*") (Guapán, Mestizo, M, 1962). Two more participants acknowledge that changes are occurring at a global level: "This change is worldwide that we are causing" ("*Este cambio es a nivel mundial que estamos causando*") (Chiquintad, M, 1960, Mestizo) (the second participant who refers to global warming is already quoted above).

At the end of the interview, the participants were asked about their knowledge of the term 'climate change' (this term was not used earlier in the interview). Eight of the research participants said that they had heard about the term 'climate change'. One of the participants notes that he has heard about it in various meetings: "Yes, a little in the meetings we have in the parish with the municipality" ("*Si, un poco sí en las reuniones que tenemos en la parroquia con municipi*o") (Honorato Vásquez, Mestizo, M, 1969). Other participants have heard about the term in the media: "Yes, it has been heard many times in the news" ("*Sí, se ha escuchado muchas veces en las noticias*") (Guapán, Mestizo, W, 1956).

Some of the research participants consider the information disseminated by the media to be credible: "The scientists have a lot of science that they already know what is going to happen later. I think that they are in reality, they want to open our eyes, but sometimes we do not want to" ("*Los científicos tienen muchas ciencia que ya saben lo que va a pasar más adelante. Pienso que ellos están en la realidad, nos quieren abrir los ojos, pero a veces no queremos*") (Chiquintad, Mestizo, W, 1980). However, others do express some criticism towards the media, as one of the respondents argues: "The information in the media is quite complex. Sometimes the media does not give real news on what is being experienced in the countryside or in the city. So my call would be that the media also should

have that responsibility to report what is really happening" ("*La información sobre los medios es bastante complejo. A veces los medios de comunicación no dan una verdadera noticia de lo que se está viviendo en el campo o en la ciudad. Entonces mi llamado sería que los medios también tengan esa responsabilidad de informar lo que verdaderamente está sucediendo*") (Chiquintad, Mestizo, M, 1960).

Another participant argues that the information shared by the media is filtered: "For me it is deficient. We are in a government where always all the information, in one way or another, is filtered and only the information that they want is transmitted" ("*Para mí es falta. Estamos en un gobierno que siempre toda la información, de una manera u otra, es filtrada y sólo es transmitida la información que ellos desean*") (Ricaurte, Mestizo, W, 1995). One of the respondents notes that in the media there is too much talking and too little action: "So many talk, but do nothing. No one. Right now everyone is talking on television, on the radio, on the internet. But it is just, excuse me for the expression, blah blah blah, nothing else" ("*Tanto hablan, pero no hacen nada. Nadie. Ahorita todo el mundo habla por la televisión, por la radio, por el internet. Pero es solo, discúlpenme la expresión, bla, bla, bla, nada más*") (Ricaurte, Mestizo, M, 1952). This criticism towards the media could explain why the participants seem to rely more heavily on observational knowledge, and provide limited references to greenhouse gasses or changes in climate conditions as a global phenomenon.

6.4.4 God

Currently, a significant part of the world's population attributes changes in climate conditions to extra-human intentionalities, instead of human activities. These conceptions seem to conflict with the notion that human activities can directly change the climate. Nevertheless, it is important to explicitly address the role of extra-human intentionalities with legitimacy, as such conceptions can significantly influence what is considered to be an appropriate response to changes in the climate. It might be considered wrong and/or impossible to prevent changes in the climate if they are part of God's plan (as is discussed further in chapter 7) (Donner 2011, p.1297-1298; Gerten and Bergmann 2012, p.5; O'Brien and Wolf 2010, p.236; Wolf and Moser 2011, p.560-561). Considering that all of the participants identify as Catholic, at the end of the interview, they were asked whether they consider God to play a role in the observed changes in the climate (in case they did not already mention it).

However, most of the participants did not consider God to play a role, and confirmed that for them it is humanity that is hurting the environment, as one of the participants states: "I think that we ourselves are the ones that are making the changes of the climate, damaging our atmosphere, our climate, our everything, with our own hands. God already made the world and I think that he will not be bad, he is not the one who is going to be destroying the climate" ("*Pienso que nosotros mismos somos los que estamos haciendo el cambio de clima, dañando nuestra atmósfera, nuestro clima, nuestro todo, con nuestras propias manos. Diosito está ya hecho el mundo y creo que él no va a ser malo, no es el que va a estar haciendo de destruir el clima*") (El Tambo, Mestizo, M, 1954). This sentiment is reiterated by another participant: "I believe that God is very good to us and I believe that we are to blame. We do so much harm to him and we are suffering something, we are squeezing him. He says that we are to blame ourselves because he is not evil, he is good" ("*Creo que Dios es muy bueno con nosotros y creo que nosotros tenemos la culpa. Hacemos tanto mal a él y estamos sufriendo algo, lo estamos apretando. Dice que tenemos la culpa nosotros mismos porque él no es mal, él es bueno*") (Ricaurte, Mestizo, W).

Nevertheless, a few participants do consider God to play a role in the perceived changes in the climate, as one of the respondents notes: "Sometimes when there is no [water] but what can we do if God Himself no longer goes to see if there is a shortage, for example right now, that is a worry" ("*A veces*

cuando ya no hay [agua] pero que podemos hacer si Dios mismo ya no ir a ver si está escasez, por ejemplo ahora mismo, eso es preocupe") (Honorato Vásquez, Indigenous, W, 1976). The interpretation of a drought as a sign of God not coming in to check reveals a similarity with the view that glacier retreat is a sign of the departure of the mountain deity (see Allison 2015, p.497 as is discussed in the previous chapter). Another participant considers the changes in the climate to be caused by God in order to stimulate collaboration between the people, the environment and God: "I probably think that it is his blessing so that the people and nature work with him. Because if he did not exist, if he does not give his spiritual similarity in my life, I do not speak, my speech is taken away. He is the power of all life in the entire world, in the entire universe. If he wants to end the world, it ends in a second for me" ("*Probablemente yo creo que eso es la bendición de él para que el pueblo y la naturaleza trabaja con él. Porque si no hubiera él, si él no da su semejanza espiritual en mi vida, yo no hablo, se me quita el habla. Él es el poder de toda la vida en el mundo entero, en todo el universo. Si él quiere acabar el mundo, acaba en un segundo para mí*") (El Tambo, Indigenous, M, 1955).

Another interviewee considers it inappropriate for humans to try to stop the changes in the climate, and argues that we should wait for the word of God: "I always say that we are seeing what is happening, but let us wait for God. He who created everything, he has the word, that his will will be done so that I can be at peace and not be afraid of anything" ("*Yo siempre digo que sí estamos viendo lo que está sucediendo, pero esperemos que Dios. Él que creó todo, él tiene la palabra, que se haga la voluntad de él para poder yo estar en paz y no tener miedo a nada*") (Guapán, Mestizo, W, 1956). The last two quoted respondents, however, do consider various human activities (e.g., limited recycling and deforestation) to contribute to the observed changes in the climate. Thus, these conceptions of extra-human intentionalities as driving changes in the climate do not necessarily conflict with the notion that human activities can (directly or indirectly) contribute to changes in the climate.

6.5 Conclusion

The aim of this chapter was to develop an understanding of how the research participants understand the perceived changes in the climate in terms of its causes. The causes that are recurrently mentioned correspond to three categories: landcover change (e.g., deforestation, degradation of the *pajonales*, and an increase in number of exotic species), contamination (e.g., waste and toxic residues in rivers), and God (e.g., negligence, punishment, or to stimulate collaboration). These causes predominantly relate to processes that are directly observable in the immediate environment. There are limited references to changes that are not directly visible, such as an increase in greenhouse gas emissions. Moreover, the emphasis is largely placed on changes that are occurring locally (i.e., in their community or in nearby cities). These findings could suggest that the influence of reception as a source of knowledge is limited, as the participants seem to rely more on observation as a source of knowledge. However, the causes of changes in the climate seem to be less frequently ascribed (directly or indirectly) to extra-human beings (e.g., God and/or Pachamama) in comparison to previous studies, which could suggest that reception has contributed to a greater emphasis on anthropogenic causes, but this could also reflect the importance placed in the Andes on taking social responsibility for changes in the environment. Considering the small sample size and the complex relations between reception and observation, no conclusive statement can be made in this regard.

Chapter 7: Response

7.1 Introduction

The final axiom is concerned with identifying the strategies that are *undertaken* to respond to the observed changes in the climate, and the strategies that are *proposed* to respond to these changes, which is expected to be largely determined by the perception, values, and knowledge related to changes in the climate. The identification of these strategies is expected to contribute to the development of climate change response policies with a greater success rate of implementation due to greater local acceptance, which might otherwise (without the consideration of campesino perspectives) deny people's rights to self-determination, perpetuate marginalization and/or adversely affect people's livelihoods (see Belfer et al 2017, p.57-58; Brugnach et al 2017, p.21; Green and Raygorodetsky 2010, p.242; Mearns and Norton 2010, p.18-19; Ramos-Castillo et al 2017, p.2; Reid et al 2014, p.403; Shackleton et al 2015, p.322-323; Tikjøb and Verner 2010, p.332).

The aim of this chapter is to identify which strategies of response to changes in the climate are considered to be effective and appropriate, and how the selection of these strategies is influenced by perceptions, values and knowledge related to changes in the climate. First, the findings of previous studies on (predominantly) autonomous responses to changes in the climate are described. Second, the conceptualization of the terms 'adaptation' and 'mitigation' as the main forms of response to climate change is discussed. Finally, it is discussed how the previously addressed axioms influence the strategies of response that the participants are engaged in and/or suggest should be undertaken.

7.2 Previous Studies

Andean campesinos have developed a sophisticated body of knowledge and practices to accommodate climate variability in the region, which has allowed them to ensure basic needs despite growing climate uncertainty and risk (Boillat and Berkes 2013, p.10-11; López et al 2017, p.31-32; López-i-Gelats et al 2015, p.267; Perez et al 2010, p.71; Torres 2014, p.1; Vidaurre de la Riva et al 2013, p.110). However, their ability to accommodate climate variability is now being stretched to a breaking point due to the magnitude of the effects of climate change, as seasonal variations have become so unpredictable that the knowledge and practices developed to respond to the normal span of variation can no longer ensure basic needs (Frenierre and Mark 2017, p.980; Kronik and Verner 2010a, p.101-102). Various studies have looked into the strategies that are adopted by Andean campesinos to respond to increased climate variability. Below the findings of these studies are summarized. It concerns five studies from Bolivia (Boillat and Berkes 2013; McDowell and Hess 2012; Meldrum et al 2018; Taboada et al 2014; 2017; Valdivia et al 2010), six studies from Peru (Crespeigne et al 2010; Lasage et al 2015; López-i-Gelats et al 2015; Ponce 2018; 2020; Postigo 2013; Walshe and Argumedo 2016), one study from Colombia (Murtinho 2016), and one study from Ecuador (Oyarzun 2013).

One recurrent strategy farmers across the globe use to minimize the risk of harvest failure due to changes in the climate is the diversification of various aspects of their livelihoods (see Pyhälä et al 2016, p.10; Salick et al 2007, p.15). In the Andean highlands, diversification includes – firstly – the distribution of risk across altitudinally arranged agroclimatic belts (or ecological zones). Various Andean campesinos have started to cultivate crops at higher altitudes (in a different ecological zone) in response to higher temperatures (Boillat and Berkes 2013, p.4; Crespeigne et al 2010, p.4; López-i-Gelats et al 2015, p.267; McDowell and Hess 2012, p 346; Oyarzun 2013, p.517; Walshe and Argumedo 2016, p.170). Secondly, diversification in the Andes involves the distribution of risk through the cultivation of a large variety of crops with different traits and tolerances (Crespeigne et al 2010, p.3; McDowell and Hess 2012, p 346; Meldrum et al 2018, p.704; 725; Oyarzun 2013, p.517;

Ponce 2018, p.7; 15; Walshe and Argumedo 2016, p.169). Thirdly, diversification in the Andean highlands concerns the supplementation of income with new activities, such as off-farm labor, eco-tourism, and/or the exploration of new markets, which can act as a safety net in times of uncertainty (Boillat and Berkes 2013, p.9; Crespeigne et al 2010, p.3; McDowell and Hess 2012, p.346; Meldrum et al 2018, p.719; Valdivia et al 2010, p.822; Walshe and Argumedo 2016, p.170).

Furthermore, in response to changes in the climate, farmers may adopt new crop varieties and/or species (Salick et al 2007, p.16). In the Andean highlands, campesinos have shifted to the cultivation of crops with a higher tolerance to various stresses (e.g., frost, hail, drought and pests), early-maturing varieties, and crops with a higher yield and/or value (López-i-Gelats et al 2015, p.279-280; McDowell and Hess 2012, p.346; Meldrum et al 2018, p.719; Ponce 2018, p.7; Ponce 2020, p.16; Postigo 2013, p.196; Taboada et al 2014, p.19; Taboada et al 2017, p.148). Andean campesinos have also shifted to a greater reliance on livestock – rather than crops – due to increased climate variability resulting in uncertain growing conditions, as livestock is less susceptible to changes in the climate (McDowell and Hess 2012, p.346-349; Meldrum et al 2018, p.719). Furthermore, campesinos have altered the timing of various agricultural activities in response to changes in climate conditions, by – for example – irrigating at night in order to limit evapotranspiration due to an increase in temperatures. Some campesinos have started to sow later due to a delayed rainy season, while other campesinos have started to sow earlier due to a decline in frost risk (Crespeigne et al 2010, p.3; McDowell and Hess 2012, p.348; Meldrum et al 2018, p.719; Postigo 2013, p.196; Taboada et al 2017, p.148). Additionally, Andean campesinos have engaged more frequently in religious and/or spiritual practices to ward away climatic hazards or to ask for rain (Boillat and Berkes 2013, p.8; McDowell and Hess 2012, p.346). Finally, various campesinos have adopted changes in agricultural techniques, such as: an increased reliance on irrigation instead of rain-fed agriculture, improvements in soil management, different forecasting techniques, water reservoirs, and greater protection of upstream forests to enhance water infiltration and to reduce erosion (Boillat and Berkes 2013, p.10; Crespeigne et al 2010, p.12; Lasage et al 2015, p.1757-1758; McDowell and Hess 2012, p.348; Meldrum et al 2018, p.719; Murtinho 2016, p.135).

The above-mentioned studies predominantly discuss strategies to *adapt* to changing climate conditions, rather than strategies that aim to stop or slow down changes in the climate. It is unclear whether this reflects a bias from the researchers who conducted the studies, or if this is the predominant form of response that the research participants are engaged in. However, in most of these studies the term 'adaptation' is used in the title, which could suggest that it is the focus of the research. On the one hand it is reasonable for the researchers to focus on adaptation, as we cannot expect the people who contribute the least to greenhouse gas emissions to take on the responsibility to mitigate climate change. Nevertheless, attention should be paid to the mitigative strategies that campesinos in the Andean highlands are engaged in or propose should be undertaken, as programs implemented to mitigate climate change have the potential to adversely affect their livelihoods. For example, the strategy of substituting fossil fuels with biofuels in order to reduce greenhouse gas emissions, as a strategy to contribute to climate change mitigation, has resulted in the expansion of oil palm plantations with adverse effects on nearby communities. In Ecuador, oil palm plantations have resulted in the destruction of native forests, the contamination of rivers, dispossession of lands, and the violation of Afro-Ecuadorian and indigenous peoples' rights (Hazlewood 2012, p.120-122; see also Boddiger 2007 on the effects of biofuel production on the quantity and quality of water).

7.3 Adaptation and Mitigation

In research and policy, response to climate change is largely understood in terms of either mitigation or adaptation (see e.g., IPCC 2014). Mitigation is defined by the IPCC (2014, p.76) as: "the process of reducing emissions or enhancing sinks of greenhouse gases (GHGs), so as to limit future climate change", while adaptation is defined as: "the process of adjustment to actual or expected climate and its effects in order to either lessen or avoid harm or exploit beneficial opportunities" (IPCC 2014, p.76). Numerous scholars have reported various concerns regarding the manner in which the terms adaptation and mitigation are understood and implemented.

'Adaptation' is predominantly approached as a linear process, involving the identification of readily identifiable and disconnected actions – that are commonly technological in nature and implemented through a top-down approach – to respond to the predicted impact of climate change with a particular measurable goal (e.g., economic well-being). Such a conceptualization of adaptation is criticized by various scholars for the following reasons: 1) it neglects the highly context specific nature of adaptation, 2) it overlooks already ongoing processes of autonomous adaptation, and 3) it fails to consider the underlying factors that determine the capacity of an individual and/or group to adapt (e.g., values, social networks, and power), and – as such – do not take into account questions of equity, legitimacy, and social acceptability. For these reasons, 'adaptation' should rather be understood as a set of diverse intersecting processes involving cycles of learning, anticipation and responses to a variety of stresses (including environmental and social changes). This reformulation is considered to acknowledge that the people affected by changes in the climate are active agents with particular knowledge, values, and aspirations, instead of being portrayed as passive victims (see Crane et al 2011, p.179; Crate 2011, p.180; Eriksen 2015, p.524-525; Gagné et al 2014, p.798; Head 2010, p.237; Orlove 2009, p.160; Rasmussen 2016, p.76-77; Thornton and Manasfi 2010, p.133; 148; Tschakert and Dietrich 2010, p.12-14; Wolf 2011, p.21-23).

Additionally, the constructed dichotomy in the description of adaptation and mitigation is criticized by various scholars. 'Adaptation' is frequently described as a reactive, localized and individualized process oriented towards short-term results with a focus on flexibility, while 'mitigation' is predominantly considered to be an anticipatory process that is initiated at international and national levels, oriented towards long-term results with a focus on stability. This dichotomy is overly simplistic and creates unnecessary contradictions between the two concepts, as – for example – both adaptation and mitigation can occur at various temporal and geographic scales (see Arbuckle 2015, p.214; Biesbroek 2009, p.232; Head 2010, p.236-237; Jennings 2011, p.239; Klein et al 2007, p.747; Thornton and Comberti 2018, p.5). Orlove (2009, p.131) argues that this terminology often does not accurately represent the perspectives of the people affected by the impacts of climate change. This can be similarly observed in the context of this research, as the research participants do not use these terms, and the above-described differential characteristics of mitigation and adaptation do not correspond with the manner in which the research participants undertake actions to respond to changes in the climate (e.g., both processes are long-term and appear to predominantly take place at the local level). Moreover, the definition of mitigation as a process focused on the reduction of greenhouse gas emissions cannot be applied in the research context to understand the perspectives of the research participants, as the participants mostly do not consider greenhouse gas emissions as a cause of the perceived changes in the climate. Nevertheless, the participants do engage in activities that aim to limit future changes in the climate, and activities that aim to adapt their livelihoods to changes in the climate. Therefore, there may be some descriptive and analytic utility in applying this distinction to the case-study, but the definition and implementation of 'mitigation' needs to be adapted. Mitigation is here understood as the process of limiting future changes in the climate.

7.4 Case-study

7.4.1 Description of Strategies

The research participants were asked various questions in order to elucidate the strategies that they engage in to respond to the perceived changes in the climate and the strategies that they think should be undertaken, such as: 1) What do you do in the face of these challenges?, and 2) How can your worries be resolved? The strategies most frequently mentioned by the participants in response to these questions are: reforestation (with native species), reducing contamination (of waste and toxic residues), and improving education (on how to behave towards the environment).

Reforestation

A frequently cited strategy that the research participants engage in and/or suggest should be undertaken is reforestation. The implementation of this strategy is motivated by the need to maintain humidity in the soil, as one participant states: "I plant trees to protect the slopes. Trees help maintain moisture" ("*Yo siembro árboles para proteger las vertientes. Los árboles ayudan a mantener la humedad*") (Catacocha, Indigenous, M). Another participant reiterates this sentiment: "That is why we want to maintain the forests, because at night it produces water" ("*Por eso nosotros queremos mantener los bosques, porque en la noche produce el agua*") (Guapán, Mestizo, W, 1956).

Some of the participants emphasize that specifically native trees should be grown. One respondent notes that native plants will bring the fog or mist: "Right now what we are doing is planting native plants to counteract. […] I have always said to my friends, to my colleagues, let's not cut the native plants. […] To stop the changes we must commit ourselves, it is maintaining the biodiversity, planting native plants – not exotic – in order to call the air and the fog" ("*Ahorita nosotros estamos haciendo es sembrar las plantas nativas para contrarrestar. […] Siempre he dicho a mis amigos, a mis compañeros, no cortemos las plantas nativas. […] Para detener los cambios debemos comprometernos, es manteniendo la biodiversidad, sembrando plantas nativas, no exóticas, para llamar el aire y la niebla*") (El Tambo, Indigenous, M, 1955). Another participant similarly argues: "That would be very important, a proper planting of native trees" ("*Eso sería muy importante, una siembra propiamente de árboles nativos*") (El Tambo, Mestizo, M, 1954).

Reducing Contamination

Numerous participants mention the need for reducing the amount of waste in rivers (or the environment in general), because waste is considered to reduce the quantity and quality of the water, as one of the respondents states: "Do not throw away trash in the rivers and the mountains. Because of that the rivers will dry up" ("*No botar a los ríos y los montañas. Por eso va a secar los ríos*") (Jerusalén, Mestizo, M, 1943). Various methods are mentioned to achieve this goal. One of the participants argues for better communication on the issue: "Let there be socialization to be able to communicate and say that it is not okay to throw trash in the rivers" ("*Que haya socialización para poder comunicarse y decir que no está bien lo que se está botando basura a los ríos*") (Guapán, Mestizo, W, 1956).

A few participants mention that they organize *mingas* to collect waste from the environment: "We are organizing *mingas* to take care of the environment, collect garbage and everything so that it is not contaminated" ("*Estamos organizando mingas a cuidar el medio ambiente, recoger basuras y todo para que no se contamine*") (Honorato Vásquez, Mestizo, M, 1969). Another participant similarly states: "We are doing the big cleaning *mingas* of the river banks" ("*Estamos realizando las grandes mingas de limpieza de las riberas de los ríos*") (Chiquintad, Mestizo, M, 1960). When visiting the

parish of Ricaurte, there was also a group of local community members who were collectively cleaning the irrigation canal in a *minga* format. In the Andean highlands, *mingas* refer to different types of communal work (see Escobar 2009, p.306). Another respondent mentions a change in technology that they are working on, which is expected to reduce the amount of waste in the water that they use for irrigation: "They are giving us [water] through a pipeline and it no longer comes to the interference that is absorbing so much garbage that is in the environment" ("*Nos están dando [agua] por medio de tubería y ya no viene al interfería que viene absorbiendo tanta basura que está en el medio ambiente*") (Guapán, Mestizo, W, 1956).

Finally, another strategy mentioned by various participants is recycling: "I recycle. So my plans are to continue with this [...] and also that people are motivated not to contaminate, but rather to recycle. People should know that not everything is rubbish" ("*Yo reciclo. Entonces mis planes es seguir con esto que me gusta […] y también que la gente se motive a no contaminar, más bien a reciclar. La gente debe saber que no todo es basura*") (Catacocha, Indigenous, M). Another participant reiterates the need for recycling: "There must be a very planned and more controlled recycling. There must also be an incentive for waste pickers. I was listening to the news that in Cuenca people mention that they need to work in recycling and they pay a pittance. There must be a recycling that there is a good payment. [...] Here the government has to act" ("*Debe haber un reciclaje muy planificado y más controlado. Debe también haber un incentivo para los recicladores. Estuve escuchando las noticias que en Cuenca la gente cita que necesita trabajar en un reciclaje y pagan una miseria. Ahí debe haber un reciclaje que haya un buen pago. [...] Aquí el gobierno tiene que actuar*") (Guapán, Mestizo, M, 1962).

Improving Education

Various participants argue for the need to educate themselves, in particular the youth, regarding how to behave in relation to the environment. One of the participants states: "We have to raise awareness. This is needed already since childhood, [...] they have to form a mentality [...] with those principles at the beginning" ("*Tenemos que concientizando nosotros. Esto se necesita ya desde los niños, [...] tienen que ir formando una mentalidad [...] con esos principios del inicio*") (Guapán, Mestizo, M, 1962). Another participant similarly notes: "We have to, in that we lack a lot, educate ourselves and educate our children [...] We have to tell our little ones that we have to take care of nature, not destroy it, because if there is no mountain, there is no water, if there is no water, there is no life. [...] You have to respect her and take care of her. [...] I promise to educate my children about nature that we owe this life to" ("*Tenemos que, en eso nos faltan mucho, educarnos y educar a nuestros hijos [....] Tenemos que nuestros pequeños decirles que hay que cuidar a la naturaleza, no destruirla, porque si no hay montaña, no hay agua, si no hay agua, no hay vida. [...] Hay que respetarla y cuidarla. [...] Me comprometo a educar a mis hijos de la naturaleza que nos debemos esta vida*") (Chiquintad, Mestizo, W, 1980).

The Role of the Authorities

When discussing the above-mentioned strategies, the participants reveal their sentiments regarding the role of the authorities in providing support. Overall the participants seem to largely take on the responsibility themselves to limit the impact of changes in the climate and to prevent future changes in the climate, but they argue that the authorities also need to take more action. One of the respondents states: "It is our responsibility to raise awareness, but [...] the agencies in charge have to act more harshly. [...] If possible, there has to be a motive, because look how people come from other places, they come to throw garbage. Those gentlemen [...] must be strongly sanctioned" ("*Es responsabilidad de nosotros mismos de concientizar, pero [...] los organismos encargados, ellos tienen que actuar con*

más dureza. [...] Si es posible, tiene que haber un motivo, porque mire cómo vienen gente de otros lados, vienen a botar basura. Esos señores [...] deben ser sancionados fuertemente") (Guapán, Mestizo, M, 1962). Another participant reiterates: "That is why it is rather preferable that the authorities now [...] begin studies to plant trees so that the flows [of the rivers] from there do not drop too low. […] We also need to take care [of the water sources], not wait for the authorities" ("*Por eso que más bien es preferible que ahora comienzan las autoridades [...] unos estudios para sembrar árboles para que no bajen mucho los caudales [de los ríos] de ahí. […] Es necesario también nosotros ten cuidar [de las fuentes de agua], no esperar a las autoridades*") (El Tambo, Mestizo, M, 1954).

However, the statement of another participant reveals a conflict in ways of thinking between the community and the authorities, which could form a barrier to a collaborative effort to implement the above-mentioned strategies: "Now we have part of the heights of the grasslands that [the authorities] sold us and take away from us again because they say that we do not take care of the water sources where they are born. We do not care. So they say that they try to care. So they want to expropriate our land. [...] On the other hand we thought and said that [...] in winter time [...] we wanted to make reservoirs, a quantity of enormous water wells that is more or less two/three/four hectares more or less so on the land we have the water there for summer time so that we do not lack. But the authorities do not do that. In many ways of thinking we think like this but the authorities do not know what they think" ("*Ahora nosotros tenemos parte de las alturas de los pajonales que [las autoridases] nos vendieron y nos vuelven a quitar porque dicen que nosotros no cuidamos las fuentes de agua en donde nacen. Nosotros no cuidamos. Entonces ellos dicen que ellos tratan a cuidar. Por eso quieren desapropiar nuestros terrenos. [...] Por otra parte nosotros pensábamos y decíamos que [...] en tiempo de invierno [...] queríamos nosotros que nos hagamos reservorios, unas cantidades de pozos de agua enormes que sea más o menos son de dos/tres/cuatro hectáreas más o menos así que en el terreno tenemos el agua ahí para tiempo de verano para que no nos falten. Pero no hace eso las autoridades. De muchos modos de pensar pensamos así pero las autoridades no sé qué piensan*") (El Tambo, Mestizo, M, 1954).

Adaptation/Mitigation

It is difficult to identify whether the above-described strategies correspond to the category of 'mitigation' or 'adaptation'. The strategies directly respond to what are considered to be the causes of the perceived changes in the climate, and – as such – are aimed at limiting future changes in the climate, which would correspond to the aim of mitigation. However, these strategies are not proposed in order to reduce the emission of greenhouse gases, which is a key element in the definition of mitigation by the IPCC. Overall, I would argue that these strategies can be best described as mitigative as they directly respond to the mentioned causes of the changes in the climate. Then, there appears to be limited reference to adaptive strategies in the case-study, which could be explained by the finding that the research participants predominantly identify local causes of the observed changes in the climate, resulting in the respondents seeking local mitigative responses. Paerregaard (2018, p.360-365) similarly finds that in the Andean highlands of Peru people largely locate the causes of changes in the climate in their own community, and subsequently suggest mitigative strategies rather than adaptive strategies to respond to these changes. Nevertheless, the research participants do occasionally mention strategies that can be considered adaptative responses to changes in the climate, but these strategies are not explicitly acknowledged as such by the participants. It is possible that these actions are not discussed as responses to changes in the climate as they have been practiced in the Andean highlands for many generations in order to accommodate the inherent climate variability of the region (or function as a way to accommodate general uncertainty and risk), and are – therefore – not considered

to be novel. Meldrum et al (2018, p.725) made a similar observation in regards to a community in Bolivia.

Most of the research participants implement the adaptive strategy of diversification, including the supplementation of income with off-farm work and the cultivation of a large variety of crops. The participants – additionally – engage in the adaptive practice of crop rotation, as one of the respondents notes: "The following year the crops were rotated again. It was not a monoculture, certain products were planted at one time, in a space. The following year it was changed, it was rotated, another product was planted and so it was rotated to plant a new product in the same space" ("*Al siguiente año nuevamente se rotaba los cultivos. No era un monocultivo, se sembraba en un tiempo, en un espacio, ciertos productos. El siguiente año se cambiaba, se rotaba, se sembraba otro [producto] y así se iba rotando para sembrar en el mismo espacio un nuevo producto*") (Catacocha, Indigenous, M). Furthermore, an increased reliance on livestock in response to a reduction in the quantity of available water (as described in the previous chapter) can be considered an adaptive strategy.

Finally, the practice of looking for other sources of water is mentioned by the participants as a strategy in response to changes in the climate, and can be described as an adaptive strategy. One of the participants states: "There is no water to give the cows. We have to go lower, about six kilometers, there is a river. So there we have to bring the cars or horses" ("*No hay agua para dar agua a las vacas. Tenemos que ir más abaja, unos seis kilómetros, hay un río. Entonces ahí tenemos que traer los carros o caballos*") (Honorato Vásquez, Mestizo, M, 1969). Another respondent similarly notes: "[When there is no water] we have to look, we have to find where to get water for the cattle and we have to wait for it to rain" ("*[Cuando no hay agua] tenemos que buscar, tenemos que buscar donde sacar agua para los ganados y hay que esperar para llueve*") (Jerusalén, Indigenous, W, 1977).

7.4.2 Discussion: Analysis of Strategies in Relation to the Axioms

In this section it is assessed how the previously discussed axioms have potentially influenced the above-described strategies of response undertaken and/or proposed by the research participants.

Perception

Various scholars have argued that inaction towards climate change results from the finding that the vast majority of people consider climate change to be a global phenomenon, and – as such – generally perceive it to only impact geographically and temporally distant places and people (i.e., it is a psychologically distant issue). Therefore, first-hand experiences of local changes in the climate are hypothesized to render the issue more salient, which likely increases people's engagements with climate change (Haden et al 2012, p.1-2; Jones et al 2017, p.331; McDonald et al 2015, p.116; Spence and Pidgeon 2010, p.657). This hypothesis corresponds with the findings of my research. For the research participants a changing climate is not a phenomenon that is perceived to be occurring in the distant future or in another geographic locality, but is conceived to be a phenomenon that is currently happening in their gardens, and – therefore – the participants are engaging in various practices to respond to the changes in the climate.

Values

Religious and/or spiritual affiliations can play an important role in determining whether human activities can be considered to have an impact on the climate (e.g., it might be considered to be in God's hands). This can significantly influence whether strategies to limit future changes in the climate will arise, as such strategies are only expected to arise when changing climate conditions are conceived to be a process that humans can affect (Wolf and Moser 2011, p.14-15; Wolf et al 2013,

p.550). The research participants were asked if it is possible to stop the perceived changes in the climate. Most of the participants thought that the changes in the climate can be stopped at least to a certain extent, including the respondents who considered God to play a role in the changes in the climate. For example, one of the participants states: "I believe that if we become aware, we plant trees, we contaminate less, I believe that we can do something to stop that change" ("*Yo creo que si tomamos conciencia, sembramos árboles, contaminamos menos, creo que podemos hacer algo para detener ese cambio*" (Catacocha, Indigenous, M). The participants who did not believe that the changes in the climate can be stopped did not base their argument on a belief in a higher spiritual being, but considered it to be too late now to stop the changes in the climate. One of the respondents notes: "I think not anymore. I think that it is too late for what is next" ("*Creo que ya no. Creo que es muy tarde para lo que viene*") (Honorato Vásquez, Mestizo, M, 1969). Another participant reiterates this sentiment: "I do not think so. How can they stop it? So much contamination, all of that" ("*No creo. ¿Cómo le pueden detener? Tantas contaminación, todo eso*") (Jerusalén, Indigenous, W, 1977). Moreover, the conception of human superiority based on certain interior faculties (e.g., language and intelligence), as prominent in Christian traditions, does not lead the participants to suggest that humans are allowed to endlessly exploit the environment in order to fulfill human needs, but is considered to entail a mandate for humans to care for the nonhuman. This could explain why most of the participants take on the responsibility themselves to mitigate the changes in the climate.

Nevertheless, religious and/or spiritual beliefs are commonly viewed as a barrier to taking action to respond to changes in the climate, as the singular outcome of such beliefs is largely considered to be inactivity or denial. This could be a legacy of White's (1967) thesis regarding the relation between Christianity and human behavior towards the environment (see chapter 5), or could result from the media attention given to politically conservative evangelical Christian organizations in the USA (see Haluza-DeLay 2014, p.261). For example, Kuruppu and Liverman (2011, p.666) argue that the adoption of "avoidant behavior such as faith in God" has resulted in a lack of concern for climate change. Mortreux and Barnett (2009, p.110) argue that religion negatively effects the extent to which people are concerned about climate change. Furthermore, Haraway (2016, p.3; 6) refers to the potential of the development of religiously informed responses to climate change as "touching silliness", and argues that Christians "avoid the urgency of climate change because it touches too closely on the marrow of one's faith." On the contrary, Fair (2018, p.5) has criticized these scholars for 'belittling' religious beliefs, and considers the issue to lie with the manner in which such beliefs have been analyzed and understood rather than with religious belief itself. One important aspect that should be taken into account is the tremendous variety in religious engagements with changes in the climate, and – therefore – statements that portray religion as a homogenous category should be questioned (Haluza-DeLay 2014, p.262). Given the salience of religious and spiritual beliefs across the world, these voices need to be heard and engaged with. The possibility of religion and/or spirituality to engage with climate change mainly lies in its ability to influence people's sense of moral responsibilities, to engage a wide audience, and to provide social capital that can aid in the achievement of collective goals (Haluza-DeLay 2014, p.263).

Furthermore, the value of collectivity, as embedded in the principle of Buen Vivir, has potentially influenced the manner in which the research participants respond to changes in the climate. This value may have stimulated collective action in the form of *mingas* to reduce the contamination of water sources. In the Ecuadorian highlands, *mingas* are commonly organized for such activities as the maintenance of water supply and irrigation systems, and have been employed in the wake of disaster, displacement and resettlement in order to collectively work towards recovery (Faas 2017, p.99-100; Hoogesteger 2013, p.79). Similarly, Walshe and Argumedo (2016, p.166) argue that such values of collectivity enable communities in the Andes of Peru to respond to the challenges presented by

changes in the climate. These values are known as ayni, ayllu, yanantin and chanincha, which – in short – refer to reciprocity, collectiveness, interdependency and solidarity (Walshe and Argumedo 2016, p.166-168). Finally, the valuation of water as a vital liquid could explain why the undertaken and proposed strategies predominantly respond to perceived changes in the quantity and quality of water and/or rainfall, rather than other perceived changes in the climate and its impacts (e.g., the proliferation of pests).

Knowledge

The proposed strategies to respond to the changes in the climate directly address the identified causes of changes in the climate. For example, contamination and deforestation are considered to be the main causes of changes in the climate, and – therefore – reforestation and reducing contamination are recurrently suggested as strategies to limit future changes in the climate. The changes in the climate are largely conceived to be caused by local human activities, and – as such – the research participants are predominantly seeking local mitigative solutions. Paerregaard (2018, p.365) similarly finds that campesinos in the Andean highlands of Peru predominantly locate the causes of changes in the climate within the community and attribute it to their own agency. Therefore, these campesinos suggest that the changes in the climate need to be addressed locally, rather than at national or international levels, and – as such – largely assume the responsibility of mitigation themselves (Paerregaard 2018, p.365). These results, however, are in contrast with the findings of Haden et al (2012, p.2) who argue that global concerns regarding climate change can be expected to promote mitigative actions, while local concerns are expected to motivate adaptive actions. The opposite is observed in my study, as the research participants largely frame the changes in the climate as a local phenomenon, and predominantly mention mitigative actions. It should be noted that Haden et al (2012, p.2) understand mitigation as consisting of efforts to reduce greenhouse gas emissions. Therefore, the hypothesis may simply not be applicable in the research context.

Missing Axioms

Finally, it should be noted that the framework consisting of the four axioms (see Roncoli et al 2016) does not cover all the aspects that determine the strategies of response that the research participants are engaged in. It is surely not possible to address all the aspects influencing the manner in which people respond to changes in the climate, but there is one more axiom that should be discussed. This axiom is concerned with the political and economic conditions that often hinder people's ability to respond to changes in the climate in a manner that they wish to respond (see Cameron 2012, p.104; Green and Raygorodetsky 2010, p.239; Norton-Smith et al 2016, p.12; Whyte 2017, p.153-154).

For example, various participants speak of their parents' experiences with 'haciendas'. One of the participants notes: "Until then [the year 1968] our parents were enslaved by the haciendas" ("*Hasta ahí [el año 1968] nuestros padres fueron esclavizados por las haciendas*") (El Tambo, Indigenous, M, 1955). Another participant similarly states: "They lived on a hacienda, they only worked for the bosses. They all worked for them [...] When he sends the bosses [...] they shouted what work [our father] had to do" ("*Vivían en una hacienda, solo trabajaban para los patrones. Todos trabajaban por ellos [...] Cuando manda patrones [...] gritaban qué trabajo tenía que hacer [nuestro padre]*") (Jerusalén, Mestizo, M, 1943).

The hacienda was a large land-holding where indigenous families were exploited and forced to serve the hacienda master. It was a form of slavery that was introduced into the region through colonization, in which land and water were taken from indigenous groups by the colonizers. The indigenous families were then forced to work for the hacienda in exchange for being allowed to farm on a small

plot of land for their own subsistence (which previously was their own land), while 'free' indigenous families were displaced to higher zones characterized by poor soil quality. In Ecuador, during the agrarian reforms of the 1960s and 1970s, agricultural and pastural land was gradually returned to the families who worked on the haciendas. Indigenous groups were often left with marginal highland areas, while the fertile lowlands were given to the mestizos. During the 1980s and 1990s, the lands were divided into individual family plots and currently continue to be subdivided into even smaller plots of land based on patterns of inheritance. Many rural households in the Ecuadorian highlands now have limited access to land and water as a result of the hacienda system, which can significantly hinder their ability to respond to changes in the climate and puts their livelihoods at greater risk (Carse 2006, p.104; Hentschel and Waters 2002, p.34-35; Hidalgo et al 2017, p.73-74; Pichisaca 2001, p.8).

Limited access to land is frequently mentioned by the research participants, and is further exacerbated by population growth. For example, one of the respondents states: "Now I do not plant much anymore, because there is not much space in the field to plant. Before our parents had more land [...]. Spaces are now limited. [...] Every time there is more population and the lands are divided" ("*Yo ahora ya no siembro mucho, porque no hay mucho espacio en el terreno para sembrar. Más antes de nuestros padres tenían más terrenos [...]. Ahora los espacios son limitados. [...] Cada vez hay más población y las tierras cada vez se están dividiendo*") (Catacocha, Indigenous, M). Furthermore, access to financial capital forms a barrier to the ability of the participants to respond to the changes in the climate, as one of the participants notes: "The provincial council has no money [...] it has no resources. [...] Miss, very restrained, I beg you to take a message to the European countries to help us [...] to undertake a more progressive, more developed project. [...] We believe that we are going to improve the agriculture system because of irrigation. By gravity we do nothing, but if we irrigate by sprinkler it is something else. [Then] we do not take up much water and we take less time" ("*El consejo provincial no tiene dinero [...] no tiene recursos. [...] Señorita muy comedidamente les ruego que nos lleve un mensaje a los países Europeos que nos ayude [...] para emprender un proyecto más progresivo, más desarrollado. [...] Nosotros creo que vamos a mejorar el sistema de agricultura porque el riego. Por gravedad no hacemos nada, pero si regamos nosotros por aspersor es otra cosa. [Entonces] no ocupamos mucha agua y nos ocupamos menos tiempo*") (El Tambo, Indigenous, M, 1955).

Moreover, the exploitive system of the haciendas did not only leave behind small plots of marginal land to indigenous families, but also a colonial legacy of institutionalized marginalization. For example, one of the indigenous respondents states: "The laws exploit us, the authorities misrepresent us, deceive us, and lie to us. So the indigenous peoples, we are nowadays always enslaved, discriminated, that is how we live" ("*Las leyes nos explotan, las autoridades nos tergiversan, nos engañan y nos mienten. Entonces la gente indígena, nosotros en la actualidad siempre estamos esclavizados, discriminados, así vivimos*") (El Tambo, Indigenous, M, 1955).

7.5 Conclusion

The aim of this chapter was to identify the strategies of response that the participants undertake and/or propose to undertake in order to respond to the changes in the climate, and to investigate how the selection of these strategies is influenced by the perception, values and knowledge related to these changes. The main strategies that the research participants adopt to limit future changes in the climate are: reforestation (with native species), reducing contamination (of waste and toxic residues), and improving education on how to behave towards the environment. These strategies are mitigative as they respond to the causes of changes in the climate, and – as such – aim to limit future changes in the climate. The participants do – additionally – engage in various adaptive strategies, but these are not

necessarily undertaken in response to changes in the climate. For example, the participants diversify their livelihoods to distribute risk (e.g., through off-farm work, the cultivation of a large variety of crops, and crop rotation). Nevertheless, four strategies are identified that are specifically adaptive to the changes in the climate: 1) an increased reliance on livestock due a decrease in available water, 2) the use of other sources of water, 3) a shift from gravity-fed to sprinkler irrigation, and 4) water reservoirs. These four adaptive strategies are, however, not as frequently mentioned as the mitigative strategies. It is in this regard that the findings from my research significantly differ from previous studies conducted in the Andes, in which adaptive responses are almost exclusively mentioned. No such significant differences have been found in the previous chapters.

The previously discussed axioms influence the selection of undertaken and proposed strategies of response in various ways. Perceiving changes in the climate in the immediate environment has potentially contributed to the urgency that the participants feel towards the need to take action. The selected responsive strategies directly relate to the known causes of the observed changes in the climate. Furthermore, the participants largely locate the causes of changes in the climate in their own community, and – as such – also predominantly mention local mitigative strategies. In regards to the axiom values, the findings of my research show that religious and/or spiritual beliefs do not necessarily lead to inaction or denial in response to changes in the climate, but can elicit values of human moral behavior towards the environment that lead to an emphasis on taking social responsibility for changes in the environment (including changes in the climate). The value of collectiveness has likely contributed to the organization of *mingas* in order to implement the above-mentioned strategies of response. Finally, it is found that the political and economic conditions can significantly influence the ability of the research participants to implement the proposed responses to changes in the climate.

Chapter 8: Conclusion

8.1 Introduction

The objective of my research was to study the experiences of campesinos in the Andean highlands of Southern Ecuador with changes in the climate, and their (undertaken and proposed) responses to these changes. This is expected to contribute to a more contextualized understanding of climate change, and to assist in the identification of strategies to respond to climate change that reflect campesino needs, values and interests. The main research question was formulated as follows: What do campesinos in the Andean highlands of Southern Ecuador consider to be effective and appropriate responses to changes in the climate, and how is this influenced by perceptions, values and knowledge related to these changes? In this chapter, the main findings regarding the main research question are discussed, and the main contributions of the research for a more contextualized approach to climate change is examined. Additionally, various limitations of the research are described, and suggestions are made for future research.

8.2 Main Findings

The following strategies are recurrently considered to constitute appropriate and effective responses to changes in the climate by campesinos in the Andean highlands of Southern Ecuador: reforestation (with native species), reducing contamination (of waste and toxic residues), and improving education on how to behave towards the environment. The participants are largely willing to take on these responsibilities themselves (potentially in a *minga* format), but note that they need support from the authorities. These strategies aim to limit future changes in the climate, and are – as such – considered to constitute mitigative strategies. Moreover, sprinkler irrigation and water reservoirs are proposed (although less frequently) as potentially effective responses to changes in the climate.

The selection of these strategies is variously influenced by the perception, values and knowledge related to changes in the climate. The perception of changes in climate conditions in the immediate environment has potentially contributed to the urgency that the participants feel towards the need to take action to respond to these changes, while limited perception of changes in the climate may have had the opposite effect. Values of human moral behavior towards the environment, involving an emphasis on taking social responsibility for changes in the environment (including changes in the climate), have potentially contributed to the participants' willingness to take action to limit future changes in the climate. Moreover, the valuation of water as a vital liquid could explain why the participants predominantly mention strategies that respond to perceived changes in the quantity and quality of water/rainfall, instead of other perceived changes. The value of collectiveness has likely contributed to the organization of *mingas* in order to implement the above-described strategies of response (e.g., reducing the contamination of rivers), while the value of healthy nutrition (uncontaminated by agrochemicals) has likely contributed to the participants not considering the use of pesticides as an appropriate response to the proliferation of pests. Finally, the selected strategies of response are directly related to the known causes of the perceived changes in the climate. The participants largely locate the causes of changes in their own community, and – as such – also predominantly mention local mitigative strategies. In short, it seems that locating the perceived changes (perception) and the causes of these changes (knowledge) in their immediate environment, along with values related to taking social responsibility for changes in the environment, have contributed to the research participants largely taking on the responsibility themselves to undertake strategies to limit future changes in the climate.

8.3 Main Contributions

The findings of the research show the importance of breaking down the various implicitly assumed dichotomies that remain prevalent in climate change research (e.g., nature-culture, weather-climate, and adaptation-mitigation). This is necessary in order to enable the recognition of the validity of a large variety of perspectives (e.g., the perspectives of indigenous peoples who often think more holistically), which have remained largely ignored due to an epistemological hegemony that has placed exclusive power to determine what climate change is within transnational technical-scientific institutions. For example, the assumption of a rigid separation between culture and nature (or humans and climate) should be questioned in order to recognize humans as embedded in (or actors) in the climate (see Ingold 2007, p.S19; Knebush 2008, p.246). This allows for the climate (and its changes) to be made palpable in the everyday as a phenomenon that is experienced, and is changing people's lives and livelihoods. Such a construction of climate change (as involving felt changes) contextualizes the phenomenon in everyday lives, and – as such – can give room for the most heavily affected to voice their concerns, needs and solutions, which the construction of climate change as a global phenomenon of aggregated statistics has largely not been able to do.

Similarly, the assumption of a rigid separation between adaptation and mitigation in climate change research should be questioned. The findings of this research reveal the importance of an understanding of response in more general terms (including undertaken, proposed, mitigative and adaptive strategies of response) for two main reasons. First, the adaptation-mitigation dichotomy does not fit the manner in which the participants speak about responding to changes in the climate. The participants did not employ this terminology, nor did they make a distinction between mitigative and adaptive strategies of response. Second, the dichotomy has contributed to the exclusive focus placed on undertaken adaptive strategies of response in previous studies conducted in the Andes, which has resulted in a disregard for strategies aimed at stopping or limiting future changes in the climate, even though these mitigative strategies may be considered important to the research participants. In future research it should not be assumed that Andean campesinos are only concerned with adaptation, and the adaptation-mitigation approach should not be imposed in contexts where it does not fit.

Additionally, the findings of the research show the importance of the four axioms in order to contextualize climate change – and to challenge the epistemological hegemony – by highlighting the various ways through which humans engage with changes in the climate. The four axioms reveal that there is not just one way of perceiving, valuing, knowing, and responding to changes in the climate, but that there are a multitude of valid ways, and – as such – the axioms can aid in the deconstruction of the epistemological hegemony in the climate change debate that makes it seem as if there is only one valid way. The appropriateness of different ways of engaging with changing climate conditions is largely dependent upon context. The axioms allow for a greater understanding as to why certain responses are considered appropriate in different contexts. For example, in the research context the increased use of pesticides is largely not considered to be an appropriate response because of the valuation of healthy nutrition, while reforestation is largely considered to be an appropriate response as deforestation is known to be a cause of changes in the climate. This example reveals the various ways in which different axioms can influence what are considered to be appropriate strategies of response, and are – thus – all required to be studied for the development of contextually appropriate climate change response policies. Nevertheless, previous studies in the Andean highlands have only focused on one or two of the four axioms, but not all four. The axiom values in particular has been largely neglected in previous research on climate change in the Andes, but plays an important role in determining the appropriateness of climate change response policies.

8.4 Limitations

There are various limitations to the research that should be acknowledged. First, the studied axioms do not cover all aspects that can potentially influence undertaken strategies of response. The research has found that political and economic conditions can function as a barrier to the implementation of various strategies to respond to changes in the climate (e.g., sprinkler irrigation and water reservoirs). Second, the method of participant observation could have been an important addition to the semi-structured interviews, as – for example – values are commonly not verbally expressed, but are more easily recognizable in actions. Third, in the communities that I visited I am clearly an outsider, which may have been a barrier to building trust with the interviewees. Nevertheless, during the interviews no signs were identified that could suggest that there was a limited amount of trust, as the participants were open in their responses. Finally, only a small number of interviews were conducted, and – therefore – the results of this research do not represent all the perspectives present in the research context and it was not possible to compare the answers of the interviewees based on demographic groups (e.g., differences between gender, ethnicity, schooling or age). More interviews with campesinos in the region are, however, not expected to reveal significantly different answers, as the answers given by the various participants are quite consistent despite the diversity of the research sample. Despite all these limitations the research is considered to have provided important insight that can guide future research in the region.

8.5 Future Research

Future research should look into the implementation of the various undertaken and proposed strategies of response to changes in the climate, and how these strategies can be formulated in climate change response policies. In this regard, particular attention should be paid to the potential of political and economic conditions to form barriers to the implementation of the strategies that Andean campesinos wish to employ. Moreover, there are various conflicts that may result from these policies. Among the interviewees no conflicts were identified in suggested options of response, but – for example – the implementation of the strategy of reforestation could conflict with other land uses and livelihoods. Additionally, a conflict could arise resulting from the incorporation of the strategies proposed by the campesinos in climate change response policies, as the existing epistemological framework of these policies may differ from campesino epistemologies. For example, climate change response policies commonly focus on reducing greenhouse gas emissions as a mitigative strategy, but the strategies proposed by the campesinos in this study to limit future changes in the climate are not aimed at reducing greenhouse gas emissions. In such a situation, who will have the authority to determine what is ‘accurate’, ‘valid’, or the ‘truth’? This again emphasizes the need to address the unequal political and economic conditions. Finally, the findings of this study show that future research should engage more widely with values (i.e., not only in terms of religious and/or spiritual affiliations), and should not only focus on the adaptive responses undertaken by campesinos (which has been the focus of previous studies), because the research participants in this study clearly show a concern for mitigative responses (although not necessarily to reduce the emission of greenhouse gasses).

Notes

Chapter 1: Introduction

1. The Andean region is throughout the chapters considered to refer to the mountainous areas of Venezuela, Colombia, Ecuador, Peru, Bolivia, Argentina, and Chile.

Chapter 3: Methodological and Theoretical Framework

2. This is the number of interviews that was possible to carry out given the time available and the connections made in the field.

3. The definitions of the four axioms as formulated by Roncoli et al (2016) are considered to be too ambiguous. For example, perception is defined as follows: "how people perceive climate change through cultural lenses" (Roncoli et al. 2016, p.88). The meaning of the phrase 'cultural lenses' is not explained, nor is it discussed how such lenses influence perception. However, further in the text, perception seems to be understood as the experience of the manifestations of the weather through the human body's senses, which is more in line with how perception is defined in this study (see Roncoli et al 2016, p.90). Moreover, Roncoli et al (2016, p.99) solely understand response in terms of adaptation (not mitigation), while in my study response is understood in more general terms in order to not impose various assumptions embedded in the adaptation-mitigation framework (this is further discussed in chapter 7).

4. Spanish is not my native language. It was learned through archaeological fieldwork in the Dominican Republic and through Spanish classes. Nevertheless, there did not appear to be any communication issues between the research participants and me. The participants understood my questions, and I understood their answers.

Chapter 4: Perception

5. In addition to the human body's senses, the reception of climate information through the media may influence the perception of changes in weather patterns. This is further discussed in chapter 6.

6. Within brackets data for the identification of the interview participants are reported in the following order: location, ethnicity, gender, year of birth. If the year of birth is unknown, no year is noted.

7. This has similarly been done by Brace and Geoghegan (2010), Knebush (2008) and Vaddhanaphuti (2017).

8. It should be noted that the use of the participants' childhood as the baseline for the comparison of changes in climate conditions between the past and the present is not the same time period for all participants. The participants were born between 1943 and 1995, which constitutes a difference of 52 years. Nevertheless, there was no significant difference in the perceived changes in the climate between different age groups, suggesting that the trends in changes in weather patterns may have been relatively consistent over time. Overall, the sample of interviewees is quite diverse in terms of ethnicity, schooling, age, and place of living. The potential of this diversity to have an effect on the responses of the participants is not discussed in detail, as the sample is considered to be too small to be able to observe any significant differences in perspectives and to make any conclusive statements regarding the influence of – for example – age or gender.

9. Throughout the case-study sections in each chapter certain quotes are selected. Not all quotes related to a particular issue are shown.

Chapter 5: Values

10. The term values is here intentionally quite broadly defined, as in the various sections of the chapter more specific interpretations of the term values is discussed. Thus, one section is concerned with values in terms of human moral behavior towards the environment, as determined by spiritual and religious affiliations. Another section considers values in terms of what is regarded as important about various aspects of the environment. One more section understands values as referring to particular held values (e.g., collectivity and good nutrition) as

embedded in the principle of Buen Vivir. All of these understandings of the term values can be widely defined as 'what matters most'.

11. Throughout this chapter the term 'environment' is predominantly used, instead of the term 'nature' as for some of the research participants 'nature' does not exist. Therefore, the term 'environment' is considered to be more inclusive to various constructions of the relations between humans and nonhumans. The term 'nature' is only used when discussing conceptions in which 'nature' does clearly exist, for – as argued by Ingold (2000, p.20) – 'nature' can only exist "for a being that does not belong there, and that can look upon it." However, the 'environment' exists for everyone as there cannot be an organism without an environment. The term 'environment' here refers to "the world as it exists and takes on meaning in relation to me" (Ingold 2000, p.20).

12. Anthropocentrism can be defined as the belief that humans are superior to nonhumans, and that only humans are valuable in and of themselves (i.e., have intrinsic value), while nonhumans are only valued for their ability to fulfill human needs (i.e., have instrumental value) (Boyd 2017, p.300; Hayward 1997, p.50; Keller 2010, p.4; Sax 2011, p.36).

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